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**Human Dimensions Assessment of the
Task Force XXI Advanced Warfighter Experiment**

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U.S. Army Research Institute

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Walter Reed Army Institute of Research

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**U.S. Army Research Institute
for the Behavioral and Social Sciences**

A Directorate of the U.S. Total Army Personnel Command

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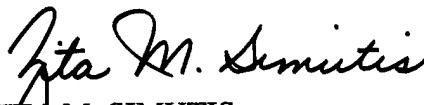
FOREWORD

The Army has launched the Force XXI Campaign Plan to guide its entrance into the age of high technology communication and information systems. This new-age technology is projected to have dramatic impacts on the battlefield of the 21st century. The Commander of the U.S. Army Training and Doctrine Command has indicated that this technology will provide soldiers and leaders with the capability to gather, process, and use information differently than ever before. However, it is well established that an organization's success at achieving the promised benefits of an innovation is a joint function of the innovation itself and the implementation of that innovation.

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), through a memorandum of agreement with the 4th Infantry Division (4ID), provides technical support in the areas of personnel performance and training to the 4ID in its role as the U.S. Army Force XXI Experimental Force (EXFOR). This report summarizes a study performed under that agreement. The study was conducted jointly by ARI and the Walter Reed Army Institute of Research (WRAIR). It was designed to investigate the impact of Force XXI modernization upon soldiers and leaders of the experimental brigade-level task force (Task Force XXI) during an Advanced Warfighter Experiment (AWE). The study was supported directly by a memorandum of agreement among the Task Force XXI AWE Study Director (U.S. Army Training and Doctrine Command Analysis Center-White Sands Missile Range), the Experimentation Officer (U. S. Army Test and Experimentation Command), ARI, and WRAIR. The research was conducted under the auspices of the EXFOR Coordination Cell (ECC) at Fort Hood, Texas.

Within a month of collecting data for each phase of this longitudinal research project, the emerging results were back briefed to commanders and leaders of units whose soldiers had provided the data. The emerging summary results over all units and all phases of the research were back briefed to the commanders of two brigade combat teams in the EXFOR and subsequently to lower echelon commanders and leaders.

This report provides empirical information on issues related to leadership, training, operational tempo, and soldier health during force modernization. It provides an historical record of the effects of new technology implementation as the Army moves toward the challenges of the Army After Next. The report can be used to identify and assess the challenges of future Army initiatives for force modernization. Information contained in this final report has been provided to senior commanders across Fort Hood and to the Digital Force Coordination Cell (DFCC) at Fort Hood.



ZITA M. SIMUTIS
Technical Director

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This research report is dedicated to the soldiers and leaders who participated in this study from the 4th Infantry Division (4ID) at Fort Hood, Texas.

The authors express sincere appreciation to the following individuals whose contributions and support made this research possible:

- *COL Thomas R. Goedkoop* and *BG Anthony M. Taguba*, who, as Commanders of the 4ID experimental 1st Brigade Combat Team and the conventional 2nd Brigade Combat Team, respectively, provided valuable assistance in creating and nurturing opportunities to collect data from soldiers under their command and to brief back the results obtained to their staffs and subordinate leaders.
- *BG Thomas F. Metz*, who, as Director of the Experimental Force (EXFOR) Coordination Cell (ECC), facilitated the collection of data necessary for this research. His actions helped to insure that we had direct access to the soldiers and leaders who became the subjects of this assessment.
- *MAJ John Stuart* for printing, preparing and assembling of over 20,000 Human Dimensions Assessment Questionnaires. Without his efforts, and the support of his staff, the mission could not have been successfully completed.
- *Mr. Charles Hoover* for his invaluable assistance in scanning and processing surveys throughout this project.

HUMAN DIMENSIONS ASSESSMENT OF THE TASK FORCE XXI ADVANCED WARFIGHTER EXPERIMENT

EXECUTIVE SUMMARY

Requirements

The success of implementing technology changes in organizations is frequently related to the effectiveness of the technology implementation process itself. By monitoring this process, key decision makers are better able to determine the extent to which observed outcomes are due to new technology, *per se*, or are the by-product of changes in the work environment brought on by the technology implementation process. The Advanced Warfighter Experiments (AWE) conducted by the 4th Infantry Division (4ID) involved changes in information technology that could cause both positive and negative changes in the work environment. Over a period of about one year, soldiers and leaders in the experimental First Brigade Combat Team (1BCT) or Task Force XXI (TF XXI) of the 4ID executed over 100 initiatives associated with the TF XXI AWE. This report summarizes human dimensions data collected during the TF XXI AWE.

Procedure

Soldier and leader perceptions of the TF XXI AWE, the work environment, and organizational outcomes were assessed using surveys developed jointly by the Army Research Institute and the Walter Reed Army Institute of Research. The effects of the AWE were also assessed using structured interviews with a slice through the command-subordinate structure of participating units. Data were collected during three time periods or assessment phases defined as Baseline, Pre-NTC, and Post-NTC. In each assessment period, surveys were distributed to all available soldiers and leaders in the 1BCT. Data were also collected, in roughly comparable time periods, from the non-experimental (conventional or analog) 2BCT of the 4ID. The 2BCT data were used to provide a context from which to interpret the 1BCT data.

Findings

Based on a review of the literature, technology changes associated with the TF XXI AWE were expected to impact the work environment. We also expected measured changes in the work environment as well as other changes caused directly by the TF XXI initiatives to be related to measures of organizational effectiveness. The findings show that while reported work hours and ratings of work-family conflict increased over the course of the AWE, there were generally no corresponding differences in the organizational outcome measures. Furthermore, while participants in the TF XXI AWE reported higher levels of work hours and work-family conflict than their counterparts in the 2BCT, their measures of organizational outcome were no different from or slightly better than those of the control group.

We attribute the absence of a relationship between these two measures of workload and the measures of organizational outcome to two other findings. First, direct ratings of workload by participants in the TF XXI AWE showed they experienced low levels of work overload, thus indicating they believed the work requirements were well within their capabilities. Second, participants in the TF XXI AWE generally reported high levels of support for their unit's

missions. Together, the absence of experienced work overload and the heightened support for their missions would tend to enhance organizational outcomes. This positive effect on organizational outcomes could offset any negative effects that might be caused by the long work hours and heightened levels of work-family conflict.

A number of individual survey items were used to assess directly specific aspects and consequences of the TF XXI initiatives. An analysis of the responses of respondents to these survey items showed the following trends over the course of the AWE. (a) While not initially as reliable as desired, the new equipment was perceived as becoming more reliable and more likely to benefit the Army. (b) The perceived adequacy of individual operator training and unit-level training began low but improved over time. (c) Initial high levels of agreement that the new technology would increase the information load, complexity, and responsibility of jobs declined over the AWE. (d) While beginning low, an increasing percentage of respondents indicated their participation in the AWE contributed to their sense of pride and accomplishment, their job performance, and the readiness of their units. In terms of long-term impact, respondents indicated a belief that information technology would have positive benefits for Army operational capabilities, but also negative implications for the quality of personal and family life and for Army programs to promote the retention and recruitment of high quality personnel.

Taken together, the findings from this effort support the conclusion that as soldiers and leaders became more familiar with the new technology and its use, they appeared to be less threatened by it, and appreciated more the positive impact it would have on them, their units, and the Army as a whole. However, the findings also support the conclusion that participation in the TF XXI AWE had some undesirable consequences on human dimensions, e.g., long work hours and work-family conflicts. The one factor most clearly associated with the less desirable outcomes was the large amount of work that had to be accomplished in a relatively short span of time. More available time or fewer initiatives could have reduced both work hour requirements and work-family conflicts. More time or fewer initiatives could have also facilitated the acquisition and integration of relevant new individual and collective skills and attitudes. The findings of this study showed that the perceived status of work hours and work-family conflict were still deteriorating at the conclusion of the AWE, while other more positive aspects of human dimensions (e.g., perceptions of training adequacy, job performance, and unit readiness) were still improving. In conclusion, the participants in the TF XXI AWE expect the new technologies will enhance Army operational capabilities and provide major benefits to those trained to use and work with the new technologies. They also expect these payoffs will incur a cost to both the soldier and to the Army-wide personnel programs and policies.

Utilization of Findings

The results of the various phases of this assessment were back briefed to commanders and leaders of the 4ID. These back briefs provided information that could be used to develop short-term programs to exploit the positive human dimensions outcomes and to mitigate any negative outcomes identified. While more research is required, the results of this assessment of the human dimensions of the Task Force XXI AWE will be of value in defining and developing programs to respond to human dimensions challenges in the future.

HUMAN DIMENSIONS ASSESSMENT OF THE TASK FORCE XXI ADVANCED WARFIGHTER EXPERIMENT

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INTRODUCTION

Background

Human dimensions assessments. Human dimensions assessments are designed to monitor how changes in work environments impact soldiers and leaders. These assessments have been an integral part of major Army initiatives for decades. In the 1980s, human dimensions researchers from Walter Reed Army Institute of Research (WRAIR) conducted longitudinal assessments of the Army's New Manning System and Unit Manning System (Marlowe, 1986). The research goal of these assessments was to examine how the implementation of new manning systems impacted work environment factors such as cohesion that in turn could contribute to unit performance.

In the 1990s, human dimensions assessments played an important role in understanding work environment stressors associated with the Persian Gulf deployment and the downsizing that occurred after that deployment (Stretch, Bliese, Marlowe, Wright, Knudson, & Hoover, 1995; 1996). More recent assessments have focused on how soldiers and leaders adapt to the role of peace keeper in sustainment and support operations such as those in Somalia and Haiti (see Halverson, Bliese, Moore, & Castro, 1995; Halverson & Bliese, 1996; Kirkland, Halverson, & Bliese, 1996). Even more recently, behavioral scientists from the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) and those from WRAIR have combined their respective resources to conduct a series of studies focused on the stress, health, and adaptation of soldiers and their families during the deployment of forces for Operation Joint Endeavor in Bosnia (see Bell, Bartone, Bartone, Schumm, & Gade, 1997; Foley & Steinberg, 1998).

Across all of these studies and situations, human dimensions assessments have provided a method of (a) quantifying and recording how the work environment of soldiers and leaders change as a function of external factors and (b) estimating the personal and organizational impact of these changes. Information from these studies has helped to preserve the fighting strength of soldiers and enhance the performance of Army units.

Task Force XXI Advanced Warfighter Experiment. The Advanced Warfighter Experiments (AWEs) associated with the 4th Infantry Division (4ID), serving as the Experimental Force (EXFOR) of the Force XXI program, caused significant changes in the work environment of soldiers. These AWEs were designed to investigate the potential for digitizing land combat forces. The digitization initiatives were highlighted by the fielding of new technology equipment, but included also changes in tactics, techniques and procedures, as well as the insertion of new concepts in organizational design. Beginning in March 1996, soldiers and leaders in the experimental First Brigade Combat Team (1BCT) or Task Force XXI (TF XXI) of the 4ID executed over 100 initiatives associated with the TF XXI AWE. A rotation at the National Training Center (NTC) in March 1997 was the capstone event of the TF XXI AWE. This NTC rotation was conducted with the same rules and procedures governing all NTC rotations while incorporating some "futuristic" digital missions.

Statement of the Problem

The relative success of implementing technological changes in organizations is frequently related to the effectiveness of the technology implementation process itself (Klein & Sorra, 1996). Consequently, when engaged in technological changes, organizations should monitor how the implementation process impacts employees. By monitoring this process, key decision makers are better able to determine the extent to which observed outcomes are due to new technology, *per se*, or are the by-product of unanticipated changes brought on by the technology implementation process in the work environment or, more directly, in the workers themselves.

The technological changes associated with the TF XXI were expected to have an impact on several important aspects of the work environment of soldiers and leaders. In theory, the changes associated with TF XXI were designed to enhance the effectiveness of individual warfighters and units by, for example, facilitating communication, increasing situational awareness, improving lethality of weapons, and enhancing battlefield decision making. The technological changes, however, also had the potential to dramatically change the work environment in other unanticipated ways. These other unanticipated changes in the work environment could have, in turn, their own positive or negative impacts on the effectiveness of the experimental task force. The human dimensions assessment described in this report quantifies the *human dimensions* of the changes that occurred in the work environment and the impact of these changes on measures of individual and organizational effectiveness.

There are, in addition, other reasons to assess the impact of the new initiatives on the human dimensions of the experimental task force. In short, by assessing the perceptions of the intended users of these initiatives toward the new initiatives themselves as well as toward the changes the initiatives cause in their work environment, we open a source of data and information about the diffused contextual environment of the TF XXI AWE. It has been well documented that the effects of information technology on organizations are not only the result of the technology itself but are also the result of the dynamic and interacting convergence of the technological forces and contextual forces that exist within the organization (see DeSanctis & Poole, 1994; McGrath & Hollingshead, 1994). Hence, by assessing the perceptions of soldiers and leaders toward their experiences in the AWE, we may contribute to a better understanding of the impact of the TF XXI initiatives on the emerging digitized force.

Command Support for a Human Dimensions Assessment of the TF XXI AWE

A formal proposal to conduct a human dimensions assessment of TF XXI was presented by WRAIR to the Deputy Commander of the U.S. Army Training and Doctrine Command (TRADOC) on February 4, 1996. The very next day, the Deputy Commander of TRADOC endorsed the proposal in a message he sent to the Commanding General of the EXFOR division, stating that in his opinion the information obtained in the assessment could be valuable. The Commanding General of the EXFOR concurred. On that same day, he sent a message to the Commander of TF XXI and to the Director of the EXFOR Coordination Cell (ECC) indicating his support for the assessment. He instructed these two individuals to follow up on necessary details. On or about February 13, 1996, the Director of the ECC and the Director of ARI expressed their desire that the ARI Scientific Research Office at Fort Hood work with WRAIR to

maximize the value of the proposed human dimensions assessment to the EXFOR. Shortly thereafter, ARI and WRAIR agreed to work this assessment as a joint project and to share costs associated with the effort.

With only one exception, the joint ARI and WRAIR team of investigators was given authorization to collect whatever data they judged to be of value to a human dimensions assessment of the TF XXI AWE. The sole exception was that the effort was not to address issues related to the training of soldiers for operating specific items of new technology. Responsibility for addressing issues related to training and training effectiveness in the TF XXI AWE had already been assigned to another Army agency.

Objectives and Rationale of the Human Dimensions Assessment of the TF XXI AWE

Based on considerations developed over nearly two decades of work in this area, as described above, and in accordance with guidance and plans developed in concert with the EXFOR, its subordinate units, and others involved in the conduct of the TF XXI AWE, three objectives were established for the human dimensions assessment of TF XXI. These objectives and their rationale were incorporated into the formal TF XXI Experimentation Directive approved by the Deputy Commander of TRADOC. They are briefly described below.

- Empirical data would be collected that accurately reflected positive or negative impact on soldiers and their leaders associated with implementing the TF XXI AWE initiatives. The major classes of variables used to assess this impact were incorporated in a conceptual working model described in the next section of this report. The data collection methods, approved by all key players in the TF XXI AWE, are also described in a later section.
- The results obtained during the initial phase of the assessment would be back briefed as soon as possible to the commanders and leaders of the units whose soldiers had provided the data. The back briefs provided to commanders of battalion- and company-sized units included information that permitted each commander to compare results obtained from his or her unit with those obtained from other comparable units. It was generally hoped that these lower echelon leaders might be able to use the results to identify and reinforce conditions that reflect positive impacts of the EXFOR program, and to intervene in ways that might eliminate or at least ameliorate conditions associated with negative impact.¹ The summary results over all phases of data collection effort were also to be prepared as a briefing presentation and provided orally and in hard copy format to all commanders and leaders of the participating units.

¹ Within a month of its collection, the results of the first phase of the data collection effort were back briefed to the unit commanders and leaders. The summary results over all phases of the effort were back briefed within two months of the completion of the overall data collection effort to the commanders of two brigade combat teams in the EXFOR and subsequently to lower echelon commanders and leaders. An annotated hard copy of the latter back brief presentation became Annex G – ARI Special Evaluation in the *Task Force XXI AWE Integrated Report*. There was no assessment of the impact the back briefs may have had on subsequent actions of the commanders and leaders to whom they were directed or on the soldiers they commanded and led. However, the briefings were generally well received. There is anecdotal evidence to suggest that some overall favorable actions may have resulted from the back briefs provided to lower echelon commanders and leaders.

- A written report would be prepared that provides a narrative summary of the information that had been collected and backed briefed to the units whose soldiers had provided the data. It was anticipated this report could be of value to senior military leaders in identifying and responding to human dimensions challenges that will continue to occur during future force modernization programs.

Purpose and Overview of this Research Product

This research product is the narrative report called for in the third objective of the TF XXI AWE Human Dimensions Assessment. As such, it is designed to provide a written context for the back briefs that were presented at the conclusion of the AWE. It is not a presentation of applied scientific research. The latter type of report would have required a more controlled assessment process and a more sophisticated data analysis methodology than was possible.

As already presented in this introduction section, this research product presents the genesis and rationale for conducting a human dimensions assessment of the TF XXI AWE. The next section of the report describes the approach that was used to guide the development of the data collection instruments and sampling methods. That section concludes with a brief description of the general characteristics of the soldiers and leaders who provided the data. Succeeding sections present a summary of the findings that were obtained from the assessment. The final two sections present an overall summary of the findings and some conclusions of the TF XXI AWE Human Dimensions Assessment.

APPROACH

Conceptual Working Model

Figure 1 summarizes the conceptual working model used to describe the potential impact of TF XXI technological changes on soldiers and leaders. Previous research leads us to predict that technological changes will affect the work environment. The changes in the work environment as well as the changes in technology affect both organizational outcomes and individual perceptions of immediate and longer-term impacts of the technology. Succeeding paragraphs briefly describe each major component of this working model.

In the human dimensions assessment, we expected the changes in the work environment to fall within two broad categories: (a) changes in the workload and (b) changes in experienced meaningfulness of the work. We looked first at changes in the workload of soldiers and leaders. Workload was expected to increase during the AWE, and we examined for this effect by measuring soldiers' and leaders' reports of work hours, their direct ratings of workload, and their ratings of work-family conflict.

The second category of the work environment that we expected to change as a function of the AWE was the degree to which soldiers and leaders attached significance to their work-related mission. In organizational research, experienced meaningfulness has been shown to be an important predictor of organizational outcomes (Hackman & Oldham, 1975). Employees who tend to feel that their job has meaning also tend to engage in a number of behaviors that are beneficial to the organization: in short, they work harder because they are more committed to the

outcome. In the TF XXI assessment, experienced meaningfulness was measured during the AWE by examining the support soldiers and leaders reported they had for their units' mission.

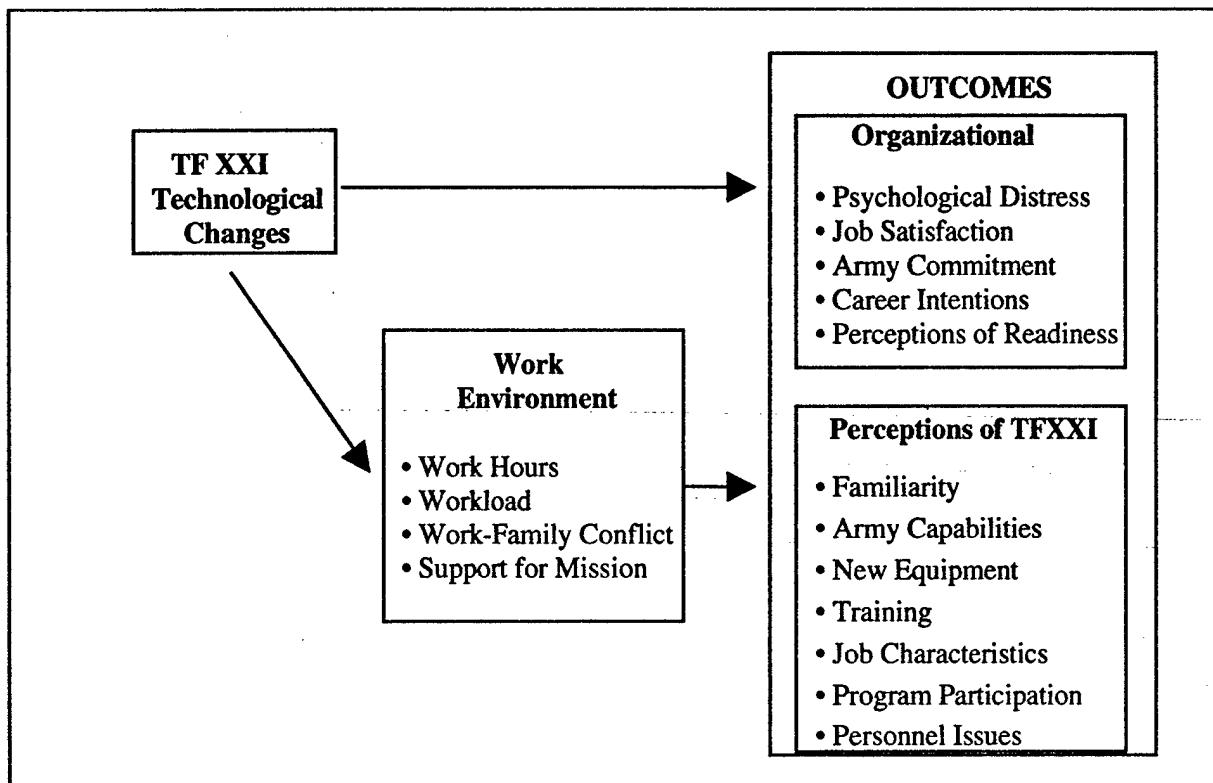


Figure 1. Conceptual model for the Task Force XXI Human Dimensions Assessment.

Changes in the work environment as well as changes caused directly by the insertion of TF XXI initiatives were expected to be related to five organizational outcomes. The outcomes were (a) psychological distress, (b) job satisfaction, (c) commitment to the Army, (d) career intentions, and (e) perceptions of readiness. Organizations that have employees with low levels of psychological distress, high job satisfaction, high commitment, low turnover intentions, and high perceptions of readiness are generally considered high performing organizations. Our goal was to determine whether the changes brought about by the TF XXI AWE had a positive, a negative, or no effect on the work environment and on these five organizational outcomes.

In addition to examining how the implementation of new technology impacts the work environment and organizational outcomes, we were interested in examining directly the perceptions of individual soldiers and leaders toward the new technology and the changes it had brought and might in the future bring to the work environment. Specifically, we addressed perceptions of soldiers and leaders for: (a) the potential long-term impact of TF XXI initiatives on the Army's capabilities; (b) the new equipment itself; (c) adequacy of training on the new equipment; (d) the technology's impact on their jobs; (e) the impact of their participation in the TF XXI AWE; and (f) the potential long-term impact of TF XXI initiatives on Army-wide personnel issues.

Data Collection Methods

The efficacy of the model presented in Figure 1 was evaluated using two types of data collection methods: surveys and interviews. These data collection methods and their development are discussed below.

Surveys. Soldier and leader perceptions of TF XXI, the work environment, and organizational outcomes were assessed using surveys developed jointly by ARI and WRAIR. Most items in the survey were positive declarative statements. Generally, respondents were asked to indicate on a five-point scale the extent to which they agreed or disagreed with each of these items. In most cases, sets of three or more items in the survey could be aggregated into scales with known reliability and validity. However, when we considered it both necessary and appropriate, new individual survey items were specifically created for and tailored to the context of the TF XXI AWE. A copy of the survey instrument is included in Appendix A.

Interviews. The human dimensions aspects of the TF XXI AWE were also assessed using structured interviews. One company or battery from each battalion as well as each separate combat support company or battery in the BCT were selected to participate in the interview process. From each selected company, four interviews were conducted: one with the Company Commander, one with the First Sergeant, one with a group of three to five Non-Commissioned Officers (NCOs), and one with a group of three to five junior enlisted soldiers. The structured interviews targeted perceptions of TF XXI technology changes and the respondents' perceptions of the impact of these changes.

Development of the data collection methods. The content and structure of the instruments used to collect data were closely associated to the three major components of the conceptual model given in Figure 1. Measures of the work environment and organizational outcomes components of the model were derived generally from those that had been used in earlier studies on the human dimensions impacts of military deployments. The use of measures used in earlier studies provides an opportunity to establish *a priori* the reliability and validity of those measures. Furthermore, maintaining a linkage between measurements used in this and the earlier studies permits the results of those earlier studies to be used as basis of comparison for those obtained in this effort.

Measures of soldier and leader perceptions toward the AWE were created specifically to assess the human dimensions impacts of TF XXI initiatives. Given that these latter measurements were newly created for use in the context of this assessment, there was no basis for determining *a priori* their measurement properties. For similar reasons, there were no prior results that could serve as a basis of comparison with the results of this effort.

Samples and Assessment Intervals

Survey and interview assessments of the work environment, organizational outcomes, and soldier and leader perceptions of the TF XXI AWE were conducted during three time intervals: August 1996; December and January 1997; and April 1997. We refer to these assessment periods or assessment phases as Baseline, Pre-NTC, and Post-NTC.

In each assessment period, surveys were distributed to all available soldiers and leaders in the 1BCT. In addition, interviews were conducted with the selected company-level units. In the Baseline assessment, 3,227 surveys were collected and 40 interviews were conducted. In the Pre-NTC assessment, 2,664 surveys were collected and 16 interviews were conducted. During the Post-NTC assessment, 2,293 surveys were collected and 50 interviews were conducted.

Besides collecting data from the 1BCT, we also collected data from the non-experimental (conventional or analog) 2BCT of the 4ID. The 2BCT data were used to provide a context from which to interpret the 1BCT data. Data were collected from the 2BCT during three time periods: June 1996, January 1997, and April 1997. These data collection intervals for the 2BCT were roughly equivalent to those used for the 1BCT.

The 2BCT data set most relevant to the human dimensions assessment of the 1BCT is the data collected from them in June 1996. We considered this data set to be most relevant because it describes the state of the 2BCT right before it deployed to NTC for its rotation. The NTC rotation of both BCTs marked the culmination of an intensive period of training and served as a major "test" of their respective capabilities. Hence, the Pre-NTC data sets obtained from the two BCTs differ principally in terms of the BCTs' level of technology: Only the 1BCT was equipped with digital systems. Comparisons of measurements from these two sets of Pre-NTC data are reported as cross-sectional comparisons. They are based on two independent samples at comparable points in their respective training cycles. In the Pre-NTC assessment period for the 2BCT, 2,880 surveys were collected and 40 interviews were conducted.

Comparisons of data across assessment periods for the experimental 1BCT are not so easy to classify as comparisons between BCTs for their respective Pre-NTC assessment periods. Since 1BCT data were obtained from *all* available soldiers and leaders during each assessment interval, the research design is neither purely cross-sectional nor purely longitudinal. Most 1BCT soldiers and leaders were assessed three times, once in each of the three assessment intervals. However, as described above, the sample size from the 1BCT decreased over the three assessment periods.

Given the nature of the data collection process, at least some losses from the sample over successive assessment periods were replaced by other soldiers or leaders who were not in the previous sample. This being the case, the more conservative approach is to treat the successive samples as if they were independent rather than correlated. Differences in measurement across successive samples will be reported as differences in measures between two samples and not as a change in measurement for one sample.

General Sample Characteristics

Demographics – Rank. Figure 2 shows that in all three 1BCT samples, the majority of respondents were junior enlisted soldiers who we refer to as Enlisted "Men" (EMs: this term is used generically and includes both male and female junior enlisted soldiers). The second highest percentage of respondents was NCOs followed by Officers. Notice that there was a higher proportion of EMs in the Baseline sample than in the Pre-NTC or Post-NTC samples. Also, notice that the percentages within each time period do not add to 100. This is true because there were a small number of Warrant Officers in each sample, as well as a small number of missing responses. Warrant Officers were not included in the analyses because of their low numbers. The Pre-NTC sample from the 2BCT contained a higher proportion of EMs and a lower

proportion of NCOs than does any of the samples from the 1BCT. The differences in percentages of soldiers within rank categories across samples suggest that the variables of interest should be controlled for rank differences when making comparisons over the course of the AWE. Consequently, when we examine human dimensions variables across samples, we always break the data down by rank category instead of examining for differences across the samples taken as a whole.

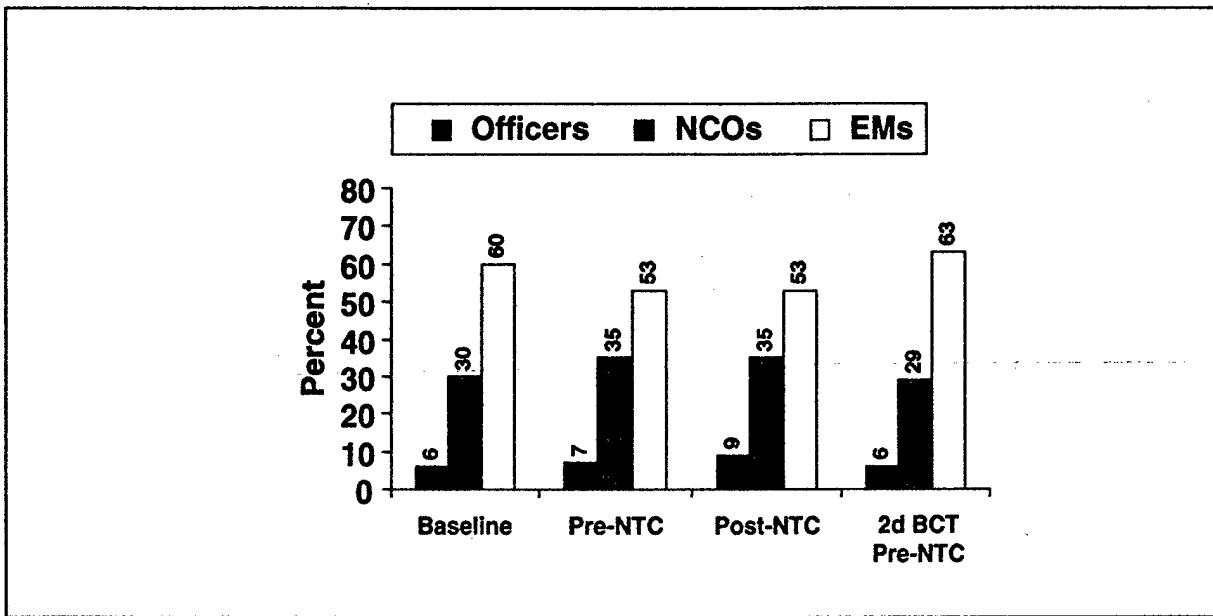


Figure 2. Percentage of soldiers responding to the survey by rank category.

Demographics – Unit type. The data collected came from a number of different types of units. Figure 3 presents the number of respondents in the August 1996 Baseline sample for the 1BCT broken down by unit type. Infantry units provided more respondents than any other unit type. Figure 3 shows, however, that surveys were collected from a variety of Combat Arms, Combat Support, and Combat Service Support units. The breakdown of the data by unit type in the other samples was similar to the pattern shown in Figure 3 for the Baseline 1BCT sample.

Data Analysis Methods

Survey data. After screening the survey data to take into account missing and incorrect responses, the data were subjected to standard methods of descriptive statistics. When justified by previous research, the responses given to individual survey items were aggregated into mean scale values for each respondent. In these cases, the five alternative responses of Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, and Strongly Agree were assigned numerical values of 1 through 5, respectively. Mean scale values greater than 3.0 indicate general agreement with the positive statements used to define a scale. Mean values less than 3.0

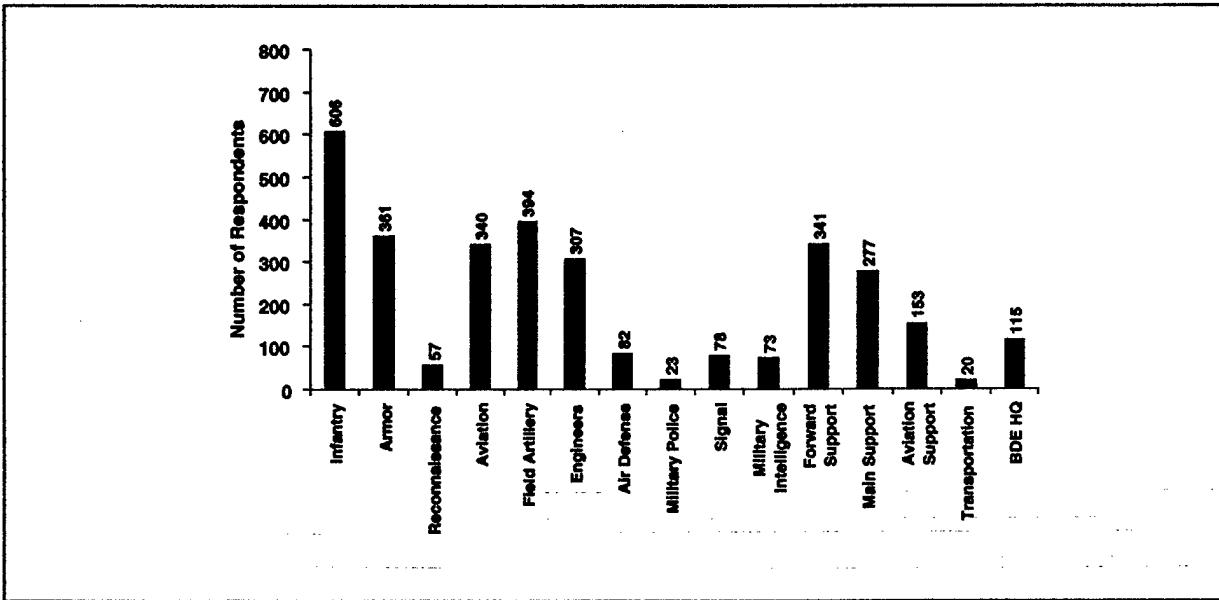


Figure 3. Number of respondents by unit type for the Baseline sample of the 1BCT.

indicate general disagreement with the statements. The scales of interest and the individual survey items that comprise each different scale will be described below as they are reported.

When a new individual survey item was developed specifically for this assessment, the frequency distribution of responses to the item was carefully examined. When appropriate, the percentage of respondents indicating they agreed or strongly agreed with the item was determined and is reported. It was considered appropriate to report the percentage of respondents generally agreeing with an individual survey item when that percentage was considerably larger (or smaller) than the corresponding percentage of respondents who generally disagreed with the item.

In these cases, the majority of respondents not in general agreement with the item indicated that they *neither agreed nor disagreed* with the item rather than that they were in disagreement with the item.

Given the large sample sizes used in making most comparisons, even small differences in average scale values or percentages of agreement tend to be statistically significant. That fact and limited available time and resources produced a situation in which inferential statistical tests were used sparingly.

Interview data. During interviews, each interviewer manually recorded the comments being made by respondents. As soon as possible after each interview session, the interviewer transcribed his or her written notes as well as other relevant recollections from the interview session into an electronic database. Because of subsequent examinations of the interview database, it was possible to establish whether comments were consistent over the AWE and over the rank and duty assignment of the respondents. When we noted consistencies, and when we considered it both necessary and appropriate to do so, we report one or more of the paraphrased comments to highlight findings we describe from the survey data. Because of constraints associated with creating interview databases, we were not able to perform rigorous analyses of the interview content.

FINDINGS FOR THE WORK ENVIRONMENT

The technological changes associated with the AWE had the potential to impact positively and negatively the work environment of soldiers and leaders in the 1BCT. In this section, we examine how four work environment factors differed over the course of the AWE. The work environment factors are (a) work hours, (b) workload, (c) work-family conflict, and (d) support for the mission. The first three factors are measures of the workload of the 1BCT soldiers and leaders. The fourth factor is a measure of the meaningfulness of work. As indicated in the introduction, these two attributes of the work environment, workload and experienced meaningfulness of work, were expected to be impacted by the AWE.

Work Hours

The first aspect of the work environment that we examined was work hours. In human dimensions assessments, work hours are considered important because there is often a strong linear relationship between the average number of hours worked and the average psychological well being of unit members (see Bliese & Halverson, 1996). High levels of psychological well being equate to low levels of psychological distress. Psychological well being or distress is considered one of the broad measures of organizational performance; high levels of psychological well being is characteristic of high performing organizations. Based on the relationship between work hours and well being, we would expect outcomes such as well-being and job satisfaction to be low if work hours were high. In other words, long work hours would be expected to be accompanied by high psychological distress, low job satisfaction, and low Army commitment.

Figure 4 shows the average number of hours worked per day over the course of the AWE for the 1BCT. Two trends are immediately obvious. One is that the number of hours worked varied by rank. Officers reported working more hours than NCOs, and NCOs reported working more hours than EMs. The second trend is that even though the number of hours worked by 1BCT soldiers and leaders would be considered high even in the Baseline data collected in August 1996, it increased substantially over successive 1BCT samples for all rank categories. Overall, these data also suggest an interaction effect: the absolute number of hours worked increased more over successive 1BCT samples for EMs than for Officers or NCOs. Furthermore, while Officers reported work hours increase in equal amount between successive samples, that reported by NCOs and EMs increased much more between the Pre- and Post-NTC samples than it did between the Baseline and Pre-NTC samples.

For a comparison, Figure 4 shows also the average number of work hours reported by members of the 2BCT prior to their NTC rotation. Notice that although members of the 2BCT were preparing for their NTC rotation at this point in time, the average number of hours worked by them was lower than the baseline number of hours worked in the 1BCT. Overall, the data shown in Figure 4 suggest that one of the effects of participating in the AWE was an increase in the number of hours worked. While the increase in work hours affected all participants of the AWE, Officers reported working more absolute numbers of hours than the NCOs or the EMs.

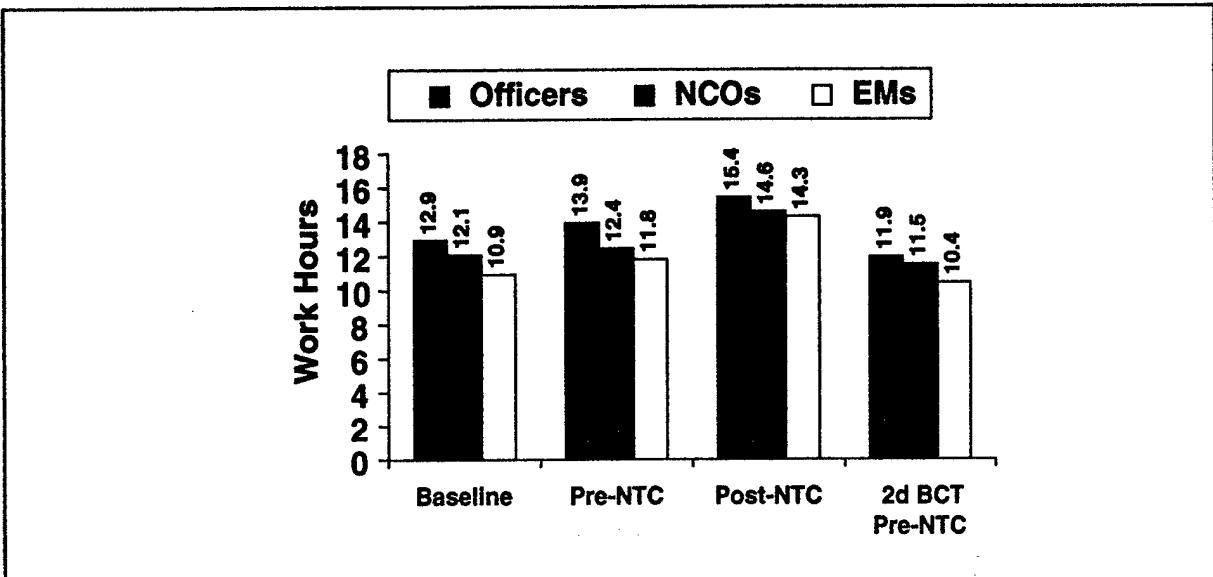


Figure 4. Average number of hours worked per day.

Interview data confirmed the data reported from the surveys. One Company Commander said, "Enlisted soldiers are working from 0600 to 1630. I am working from 0500 or 0600 to 1900. Since November, more and more selected groups have worked late. Especially hard hit with overtime is the service line who work until 1800 or later." A Staff Sergeant said, "You drive to work with the lights on and you drive home with the lights on."

Workload

Although the number of hours worked tended to be high and to increase over successive samples during the course of the AWE, it was not necessarily true that soldiers and leaders felt that these work hours exceeded their capabilities. In fact, interviews with soldiers and leaders indicated that most participants in the AWE felt that the workload demands, while high, were still well within the limits of their capabilities. To assess the issue of workload more directly, we examined respondents' rated positions on a workload scale. The workload scale used was derived from the role overload scale taken from the Michigan Organizational Assessment Questionnaire (Cammann, Fichman, Jenkins, & Klesh, 1983). It consists of the following three items: (a) I have so much work to do, I cannot do everything well, (b) I never seem to have enough time to get everything done, and (c) The amount of work I am asked to do is fair. The workload scale is thought to measure the degree to which the amount of work that needs to be accomplished is viewed as being above or below the capabilities of the respondents. Mean scale values above 3.0 are assumed to indicate the perception of some degree of work overload, those below 3.0, work underload. The scale has a reported reliability of .65 (Cammann et al., 1983); on the Baseline sample, the reliability was .54. The reliability of the scale in the other samples did not differ significantly from that in the Baseline sample.

Figure 5 provides mean ratings of the workload scale over successive 1BCT samples for the 1BCT. Comparison data from the 2BCT are also provided. The figure shows that Officers in all

assessment samples reported low levels of work overload. NCOs and EMs, however, tended to report neither work overload or work underload: their average scores tended to be essentially equal to 3.0 throughout the AWE. Notice that levels of mean workload ratings for the 1BCT samples were not appreciably different from those reported for the 2BCT Pre-NTC sample. Overall, these comparison data suggest that perceived workload was not highly influenced by participation in the AWE.

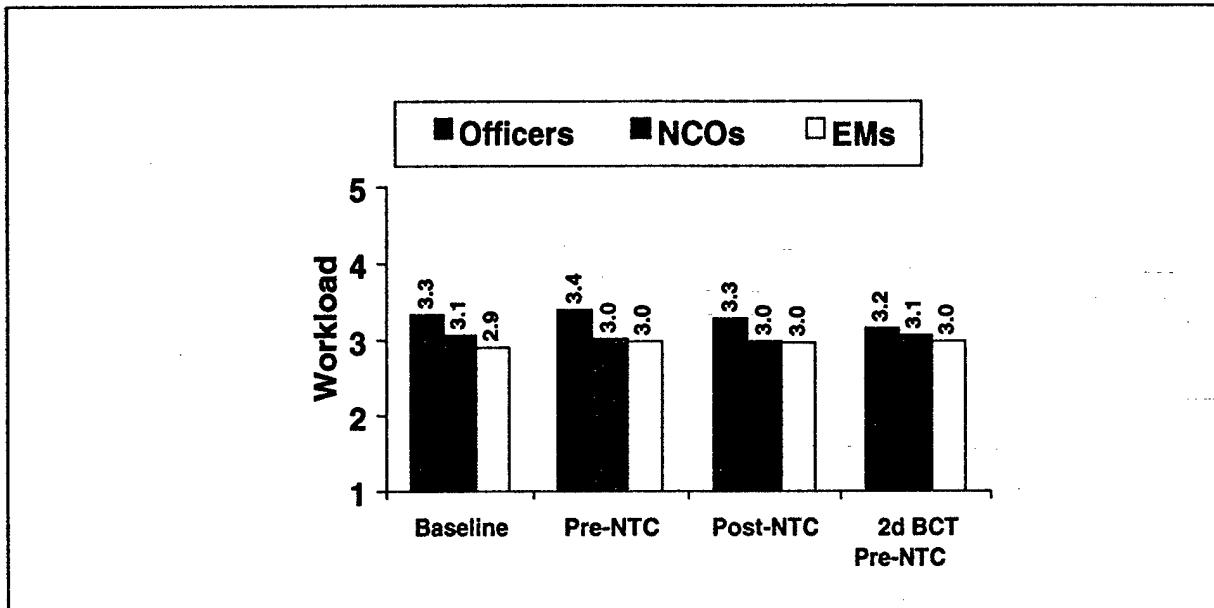


Figure 5. Mean rating of workload.

The previous analysis of work hours shows that soldiers and leaders in the 1BCT were working very many hours per workday. The results of the analysis of the mean workload scale values indicated that despite the long work hours, members of the 1BCT did not reach the point where they felt that the number of hours they were working were adversely affecting their capabilities to perform their assigned work.

Work-Family Conflict

The third facet of the work environment that has major implications for organizational performance is the area of work-family conflict. In the organizational literature, work-family conflict has been linked to retention, job satisfaction, and performance. In general, high levels of work-family conflict are related to poor retention, low job satisfaction, and poor performance.

In the current assessment, work-family conflict was assessed using a single item from the survey. Using this item, respondents indicated whether they agreed or disagreed that their current duty requirements conflicted with their family life. Figure 6 provides the percentage of respondents who agreed or strongly agreed with the statement, broken down by rank and by assessment period. The figure shows that many Officers perceive a conflict between their jobs and their families. The percentages of Officers reporting this perception increased over successive 1BCT samples in the AWE. Perceptions of work-family conflict were lower but still

substantial for NCOs and EMs. It increased slightly for NCOs over the AWE, but was constant for EMs.

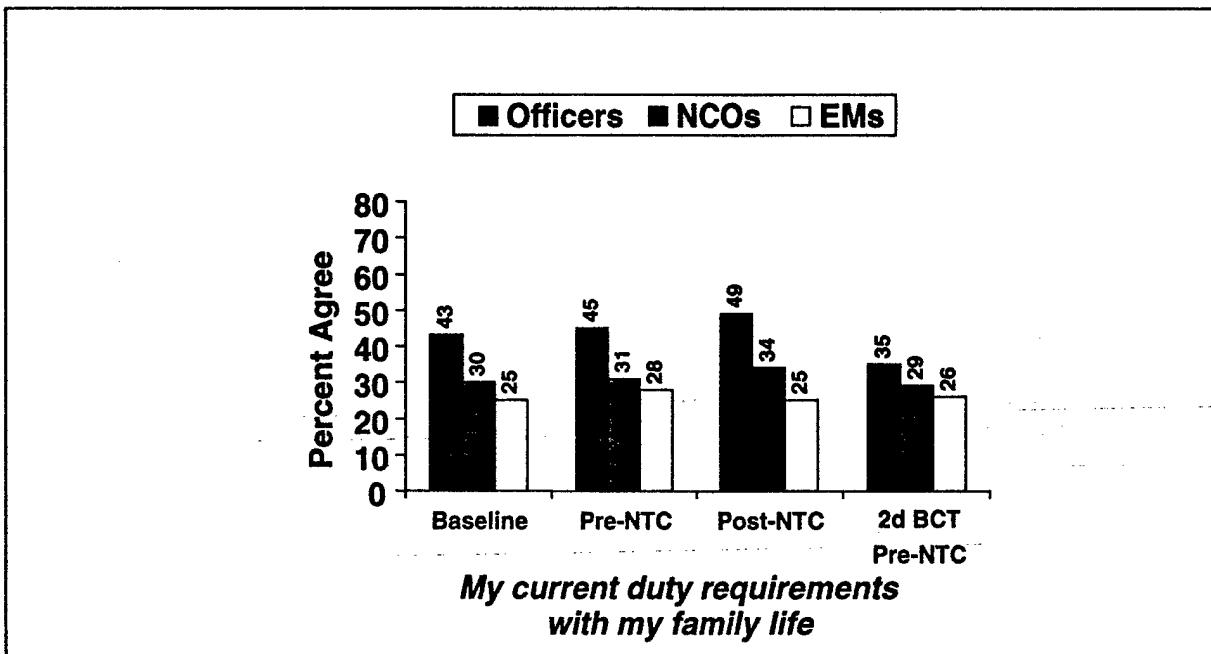


Figure 6. Percentage of respondents agreeing that work conflicts with family life.

For comparison, the levels of work-family conflict from the 2BCT prior to its NTC rotation are also given in Figure 6. Notice that work-family conflict for Officers in the 1BCT was substantially greater than it was for Officers in the 2BCT, while it was similar for NCOs and EMs across the 2BCT and 1BCT samples.

Interviews with Company Commanders reinforce the survey data by also suggesting that the AWE increased the level of work-family conflict. A Company Commander reported, "The OPTEMPO [operating tempo or rate of required activities] was so high that a price was paid in soldiers' lives. Personally, I found it very hard on my marriage. There is now a strain in the relationship that wasn't there before. I've seen [in my soldiers] dramatic increases in alcohol, drugs, spouse abuse, [as well as] an increase in animosity, with soldiers ready to pick fights with each other." Another Company Commander stated, "A lot of family members were upset that their spouse was spending a lot of time away from them. Younger families had a harder time." A third Company Commander said, "Family anxiety was caused by the unpredictable schedules that began last summer. Plus the soldiers and families were not used to being separated for more than five days."

Support for the Mission

Experienced meaningfulness in one's job has long been considered an important predictor of organizational outcomes. It is considered one of the core elements of influential organizational models such as the Job Characteristics Model (Hackman & Oldham, 1975). In recent military operations, experienced meaningfulness has been measured in terms of soldier support for the

units' mission (Halverson & Bliese, 1996). This measure has been found to predict soldier well-being, satisfaction, commitment, and several other performance-related outcomes.

Evidence suggests that individuals' willingness to endure job-related hardships while still being productive is a function of experienced meaningfulness of the job. Because of these types of findings, we assessed the degree to which soldiers and leaders felt that their work was important. Specifically, we used a support for the mission scale consisting of the following three items: (a) I believe in the value of our unit's mission, (b) Given my unit's mission, the amount of training we do makes sense, and (c) My unit's mission makes a real contribution to the Army as a whole. This scale was found to have an acceptable level of reliability (Cronbach's Alpha of .66).

Figure 7 provides the mean scores of the support for the mission scale. Several observations can be made from the figure. First, the figure shows that, in general, respondents from all rank categories in the 1BCT reported positive support for the mission. They generally agreed with positive statements about support for the mission. Second, the figure shows that support for the mission was at its highest level for the 1BCT respondents in the Pre-NTC time frame. Finally, it shows that respondents from the 1BCT have greater support for their mission in all phases of the AWE than did respondents from the 2BCT during their Pre-NTC assessment.

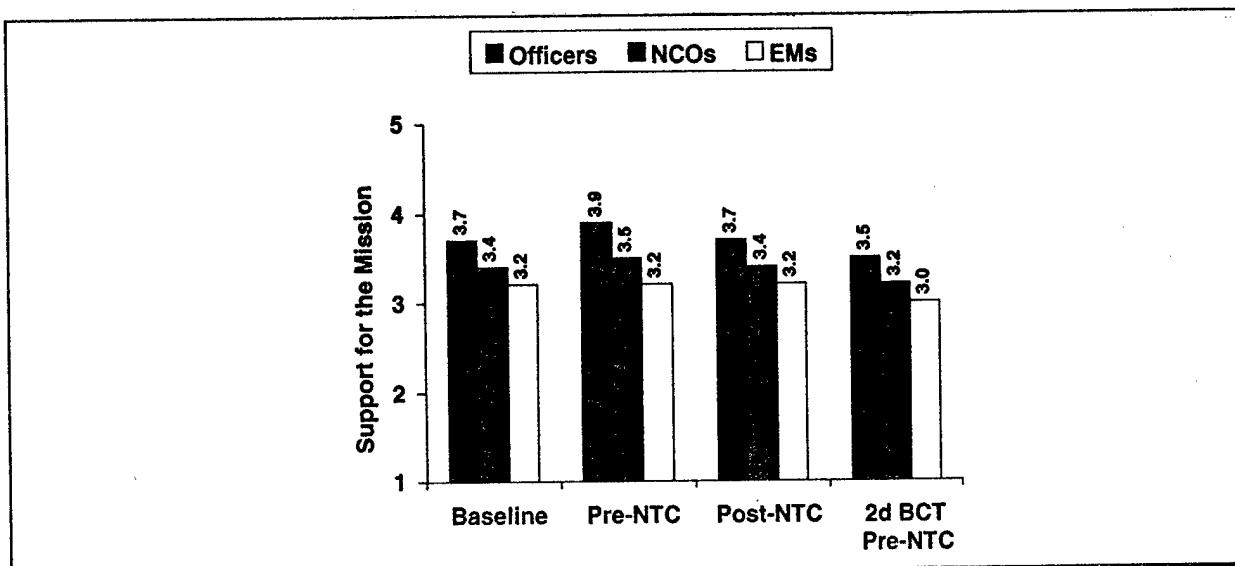


Figure 7. Mean rating of support for unit mission.

Data collected during the interviews confirms that soldiers and leaders were supportive of the AWE mission. A First Sergeant said, "There are a lot of different mentalities in the unit all trying to work together as a team. It is hard but in the end we all pulled together to get things accomplished." A Company Commander stated, "AWE was fun, it was a challenge. I'd do it again. We accomplished the mission." A junior enlisted soldier said, "We all had a job to do so we just did it. This was a positive cause, we all knew it." A Sergeant First Class stated that "Sometimes it seems that the changes are occurring too fast, but in the end all these changes will be good for us and the Army."

Summary and Conclusions for the Impact of Technology Changes on the Work Environment

The work environment of the 1BCT showed increasingly larger average numbers of work hours reported by soldiers and leaders over the course of the AWE. The high levels of work hours were most noticeable for Officers and could be associated with an increase in work-family conflict for Officers. Despite the large number of reported work hours, perceived workload levels were not universally high and did not differ appreciably over successive 1BCT samples. These findings suggest that soldiers and leaders were working long hours, but that they felt that the work required was within their capabilities. One of the factors that undoubtedly helped soldiers and leaders adjust to the high levels of work hours was their belief that their units were working on a mission that had high levels of meaningfulness and value for the Army. This latter finding was reflected in the fact that support for the mission in the 1BCT was consistently higher than support for the mission in the 2BCT.

It is clearly important to determine if and how changes in the work environment impact organizational outcome variables such as psychological distress, job satisfaction, and commitment to the Army. The high and increasing levels of work hours over successive samples in the AWE would lead one to expect negative trends in organizational outcomes. However, the respondents' belief that the work required was within their capabilities and that the mission of the unit was important would normally be associated with positive changes in organizational outcomes. In the next section, we examine the organizational outcome data.

FINDINGS FOR ORGANIZATIONAL OUTCOMES

In the previous section, we assessed four factors that have been shown in organizational research to be significant predictors of organizational effectiveness. In this section, we examine five indices of organizational effectiveness. These indices are (a) Psychological Distress, (b) Job Satisfaction, (c) Army Commitment, (d) Career Intentions, and (e) Perceptions of Readiness. Our goal in this section is to determine whether these five measures of organizational effectiveness changed over successive 1BCT samples and if they produced different results for the experimental 1BCT than they did for the conventional 2BCT.

Psychological Distress

Our assessment of psychological distress was derived from the Brief Symptom Inventory (BSI; Derogatis & Spencer, 1982). The BSI is a 53-item measure of psychological distress derived from the 90-item Symptom Checklist-Revised (SCL-90-R; Derogatis, 1977). The BSI has been used extensively in both research and clinical practice to assess psychological distress.

The BSI assesses the following nine psychological symptom dimensions: Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, Psychoticism, Obsessive-Compulsive Behavior, and Somatization. The BSI also yields three global indices of psychological distress (Derogatis & Spencer, 1982). The most widely used of these global measures is the General Severity Index (GSI). We used the GSI as a measure of the psychological distress of soldiers and leaders for this assessment.

Overall psychological distress. Figure 8 shows the mean GSI scores for the 1BCT samples over the course of the AWE. The figure shows scores from the 1BCT in comparison to garrison norms and scores from the 2BCT. Notice in the figure that the GSI scores for the 1BCT across all three-time periods were as good as or better than garrison norms. Specifically, the Baseline and Pre-NTC distress levels were nearly identical to garrison norms, and the Post-NTC distress level was lower than the garrison norms and those obtained earlier in the AWE. Also, notice that the Pre-NTC scores from the 1BCT were lower than the Pre-NTC scores from the 2BCT. This finding for 1BCT is different from those obtained in earlier studies while those for the 2BCT agree with earlier studies. Previous research has found that distress scores tend to rise above the garrison norm of .50 when the data are collected immediately before an NTC rotation.

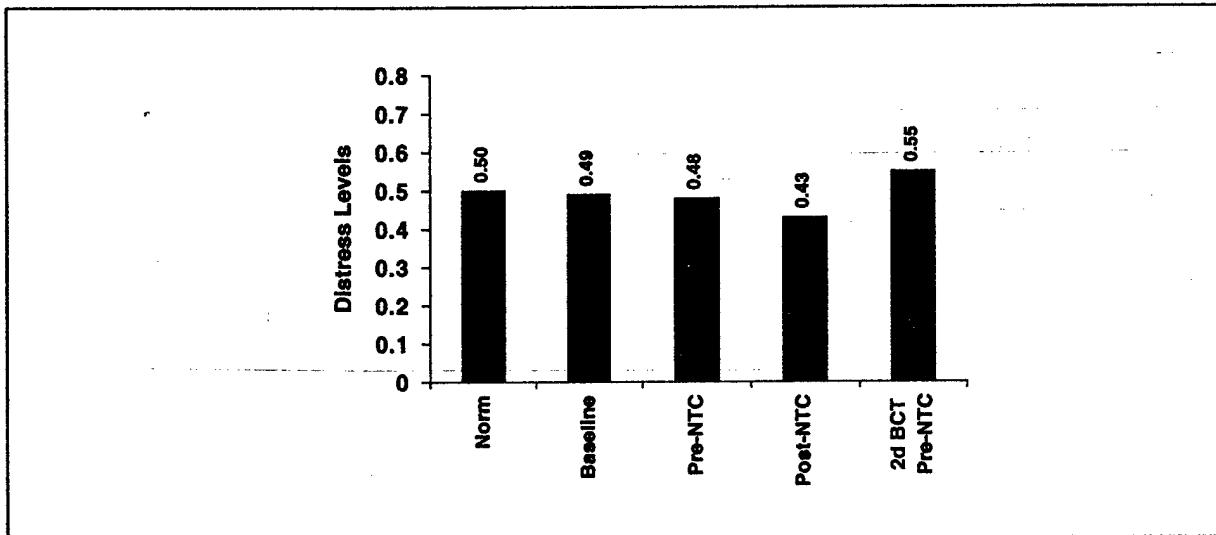


Figure 8. Mean overall level of psychological distress.

Psychological distress by rank. While the overall assessment of psychological distress indicated a slight downward trend in distress levels over assessment periods, it is valuable to examine psychological distress as a function of rank to detect trends that might be masked in an overall analysis. Furthermore, as we indicated in the introduction, it is important to examine human dimensions variables by rank in this effort because the proportions of Officers, NCOs, and EMs varied across samples. In the case of psychological distress, it has previously been shown that GSI scores vary directly with the rank of the individual (Stuart & Halverson, 1997). Figure 9 provides a breakdown of distress levels by rank.

Figure 9 shows that distress levels for EMs in the 1BCT was much less for the Post-NTC sample than for the Baseline and Pre-NTC samples. These differences for EMs were statistically significant ($p < .001$). The figure also suggests that distress levels for Officers and for NCOs differed between the Pre-NTC sample and the Post-NTC sample but these latter differences were not statistically significant ($p > .05$). Comparisons of the two Pre-NTC samples show that distress levels were higher for EMs in the 2BCT than for EMs in the 1BCT. On the other hand, Pre-NTC distress levels for Officers and NCOs in the 2BCT were quite similar to those reported by Officers and NCOs in the 1BCT. These comparisons suggest that the difference in Pre-NTC distress levels shown in Figure 9 between 1BCT and 2BCT were due principally to differences between EMs in the two samples. The 2BCT sample contains a larger proportion of EMs (see

data characteristics in the Approach section) and the EMs in the 2BCT had elevated distress scores relative to those in the 1BCT.

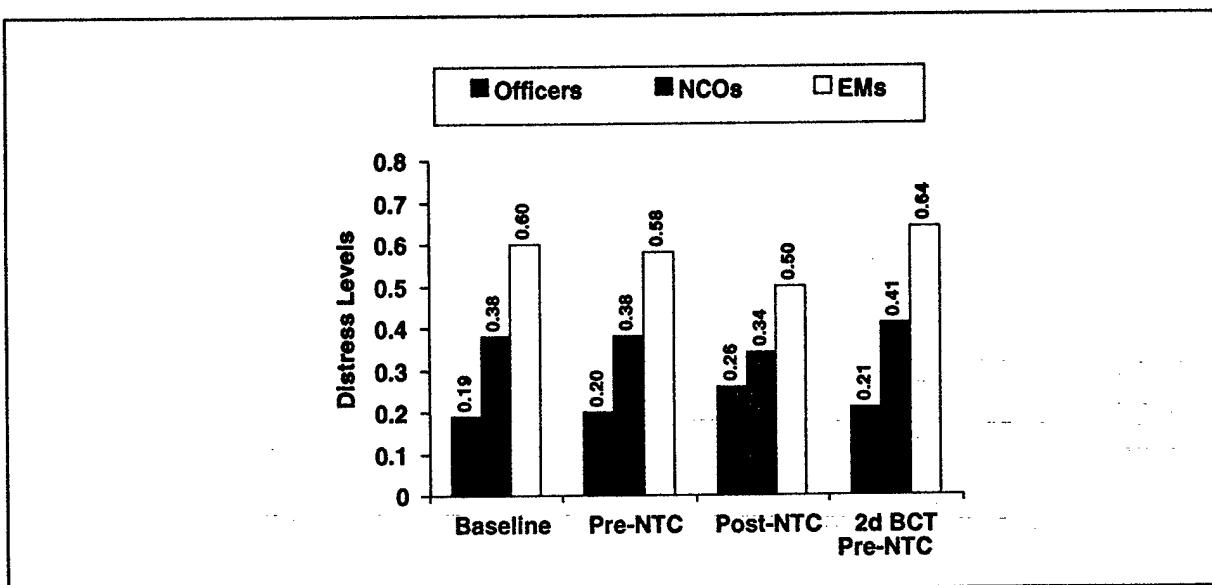


Figure 9. Mean level of psychological distress by rank.

Job Satisfaction

The second index of organizational effectiveness that we assessed was job satisfaction. Job satisfaction was assessed using a modified version of the Job Diagnostic Survey General Satisfaction Scale (Hackman & Oldham, 1975). The scale contained three items: (a) I am very satisfied with my job in the Army, (b) I like my job in the Army, and (c) I am satisfied with the kind of work I do on my job. The reliability of the scale is .84.

Figure 10 shows levels of job satisfaction broken down by rank across the three time periods. Scores above 3.0 indicate general agreement with positive statements about job satisfaction. The figure shows that job satisfaction tended to be positive throughout the AWE for Officers and NCOs. In contrast, mean job satisfaction scale values for EMs tended to be centered on 3.0, indicating neither positive nor negative perceptions of job satisfaction. In addition, job satisfaction for soldiers and leaders in the 1BCT tended to be comparable to job satisfaction levels of soldiers and leaders in the 2BCT Pre-NTC.

Levels of job satisfaction for NCOs and EMs remained relatively constant over the three 1BCT samples. For Officers, however, job satisfaction in the Post-NTC sample was lower than it was in the Baseline and Pre-NTC samples. For Officers, the difference between average scale values of 3.6 during Baseline and 3.3 at Post-NTC is statistically significant ($p < .01$). Despite this difference, it is important to note that the 3.3 value still represents positive levels of job satisfaction.

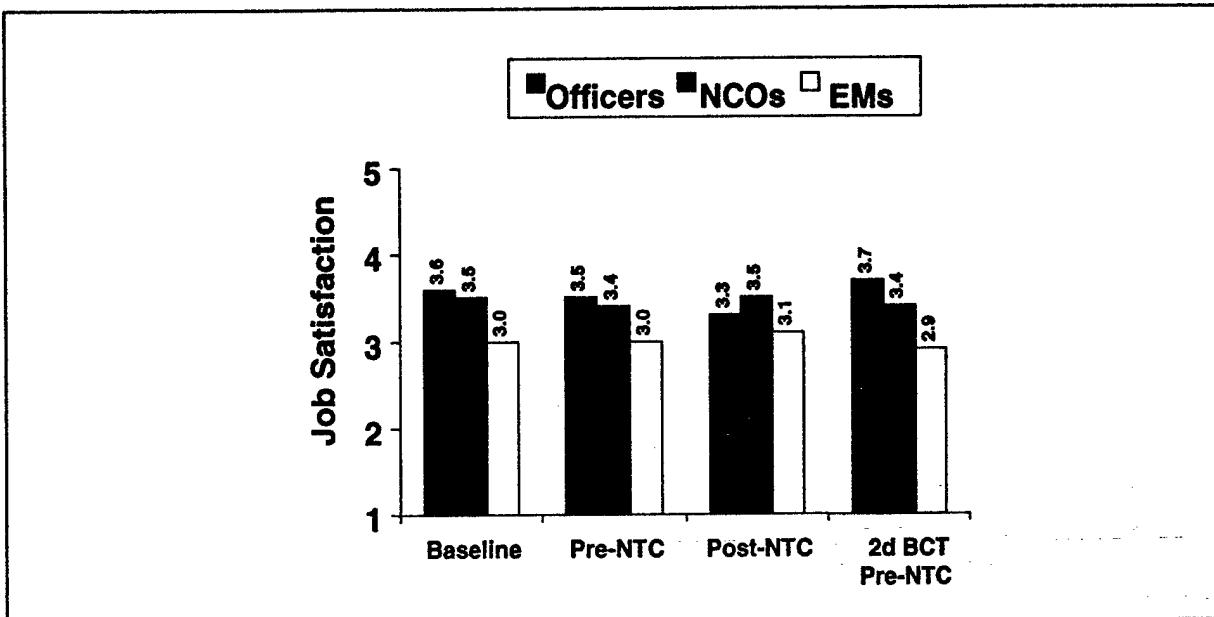


Figure 10. Mean scale value for ratings of job satisfaction.

Army Commitment

The third facet of organizational effectiveness that we examined was Army Commitment. Commitment was assessed using a three-item scale derived from Mowday, Porters, and Steers (1982). The three items are: (a) I talk up the Army to my friends as a great organization, (b) I am proud to tell others that I am part of the Army, and (c) I really care about the fate of the Army. Responses to these three items were averaged together to create an Army Commitment scale. The scale has a reliability estimate of .81.

Figure 11 shows levels of Army commitment over successive 1BCT samples. The figure indicates that levels of commitment varied as a function of rank. Officers had the highest levels of commitment, followed by NCOs and EMs. Notice that levels of commitment remained relatively unchanged over the AWE samples. Notice also that levels of commitment for the 2BCT Pre-NTC sample were nearly identical to the levels of commitment in the 1BCT.

Career Intentions

The fourth measure of organizational effectiveness examined was Career Intentions. This factor was assessed by asking soldiers and leaders to select one of five career options from a single survey item developed at ARI. The response option that showed the most meaningful result was one that indicated the respondent definitely intended to leave the Army upon completion of his or her present obligation. Figure 12 provides the percentage of soldiers and leaders that selected this option arranged by rank category.

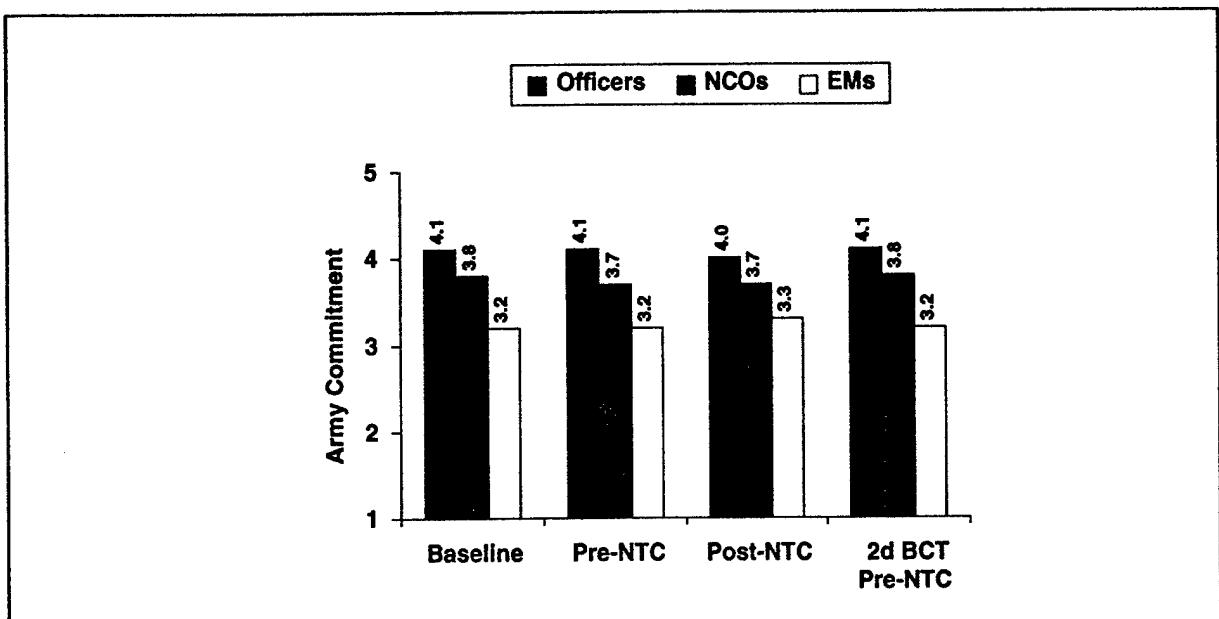


Figure 11. Mean scale value for ratings of Army commitment.

The most noticeable aspect of Figure 12 is that the percentage of 1BCT EMs indicating they intended to leave the Army was much lower in the Post-NTC sample than in the Baseline and Pre-NTC samples. Figure 12 also shows that the percentage of EMs indicating they intended to leave the Army was lower in the 1BCT Pre-NTC sample than in the corresponding 2BCT sample. The percentage of Officers and NCOs reporting they intended to leave the Army was about the same over successive 1BCT samples and between the 1BCT and 2BCT Pre-NTC samples.

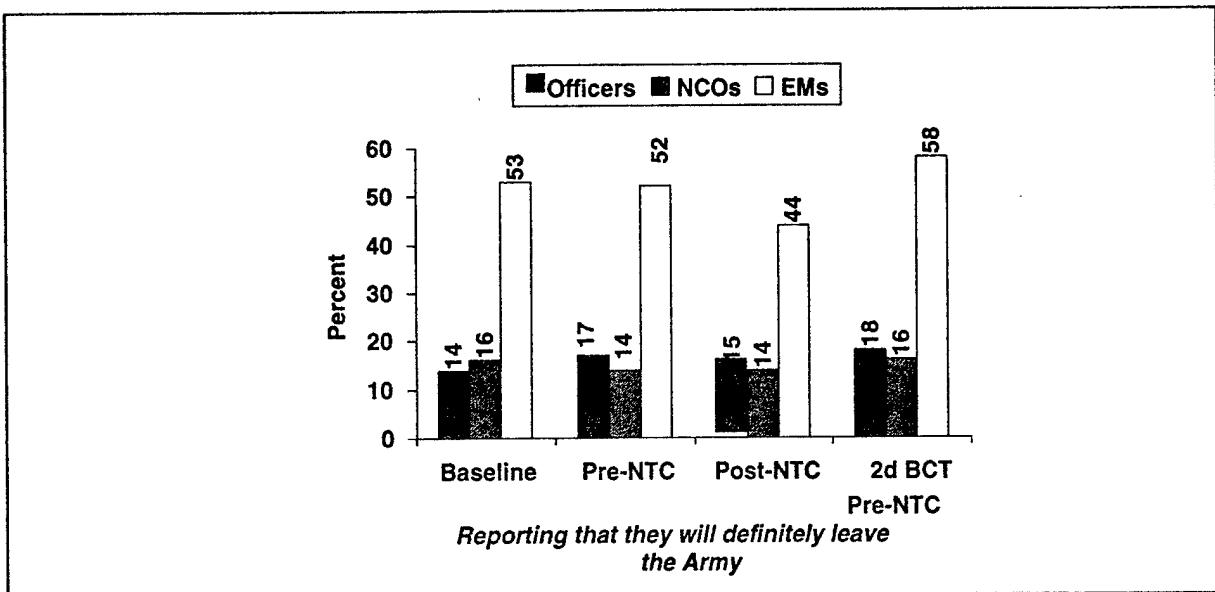


Figure 12. Percentage of respondents intending to leave the Army after current obligation.

Perceptions of Readiness

The perception of unit readiness was the fifth and final organizational effectiveness outcome that was assessed. Perceptions of readiness were assessed using a four-item scale developed at WRAIR. Using this scale, soldiers and leaders were asked to indicate the degree to which they agreed or disagreed with the following statements: (a) I think my unit would do a better job in combat than most U.S. Army units, (b) I think the level of training in this company is high, (c) I have real confidence in my unit's ability to perform its mission, and (d) If we went to war tomorrow, I would feel good about going with my unit. Responses by each participant to these four items were averaged to create a mean readiness scale value. The reliability of the scale was .83. Readiness was first analyzed in terms of overall perceived readiness in the two BCTs and then it was analyzed in terms of perceived readiness at the company level in the 1BCT.

Perceived Readiness across the BCT samples. Figure 13 shows perceptions of readiness for each of the three 1BCT samples and the Pre-NTC 2BCT sample. These data show a consistent effect of rank categories. The mean scale values suggest that Officers more than NCOs believed their units were ready to perform their war fighting missions. The mean readiness scale values for 1BCT EMs was centered at or near the mid-point of the scale, indicating they neither agreed nor disagreed with the positive statements concerning readiness. Except for Officers, the perceptions of unit readiness were constant over the AWE. Perceptions of readiness for Officers were higher in the Pre-NTC sample than in the other two samples. The 3.7 value on the readiness scale for the Pre-NTC sample was significantly higher than both the Baseline value of 3.3 ($p < .001$) and the Post-NTC value of 3.5 ($p < .05$). Finally, the data given in Figure 13 show that perceptions of readiness in the 1BCT Pre-NTC sample were comparable to those in the 2BCT Pre-NTC sample with the exception of the elevated perception of readiness found for Officers during the 1BCT Pre-NTC sample.

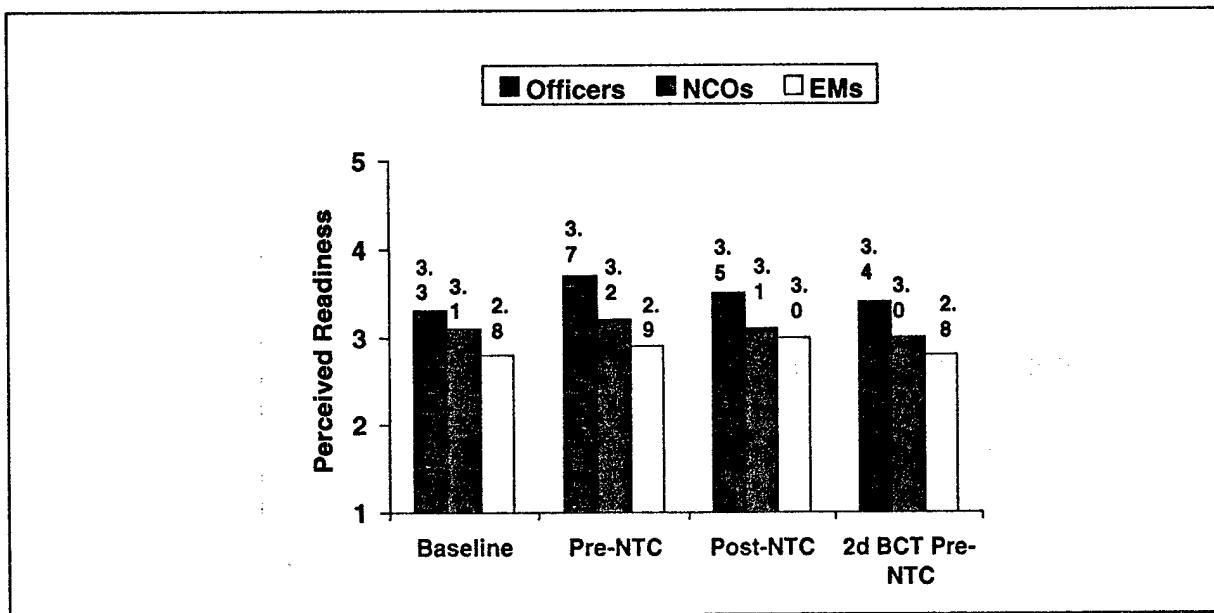


Figure 13. Mean scale value for ratings of unit readiness.

Readiness at the company level. More extensive analyses of the 1BCT data revealed that perceptions of readiness varied significantly at the Company level: some Companies reported high levels of perceived readiness while other Companies reported relatively low levels of perceived readiness. As a means of modeling this variation, we examined several factors that were expected to be related to mean values of perceived readiness at the Company level. These analyses revealed that one of the strongest predictors of Company-level readiness was the perception of vertical cohesion within the unit. Vertical cohesion was assessed by asking soldiers and leaders to rate the competence and consideration of both their Officers and NCOs. The vertical cohesion scale was developed at WRAIR. It is a twelve-item scale with a reliability of .92.

Figure 14 shows the relationship between average level of perceived vertical cohesion within a Company and the average level of perceived readiness within the same Company for the 1BCT Baseline sample. The scatter plot shows that some Companies rated their readiness quite negatively (well below 3.0) while other Companies rated their readiness highly (close to 4.0). The data also show that mean perceptions of leadership (vertical cohesion) varied from low (approximately 2.5) to very high (close to 4.0). It was determined that the correlation between the two variables is statistically significant ($r = .68, p < .001$). The Pre-NTC and Post-NTC 1BCT samples showed similar relationships between vertical cohesion and perceived readiness.

As has been previously shown (Bliese & Halverson, 1996; Halverson et al., 1995), the relationship illustrated in Figure 14 demonstrates the importance of Company-level leadership in determining organizational effectiveness. It also shows that significant company-level variation often exists on important variables of interest.

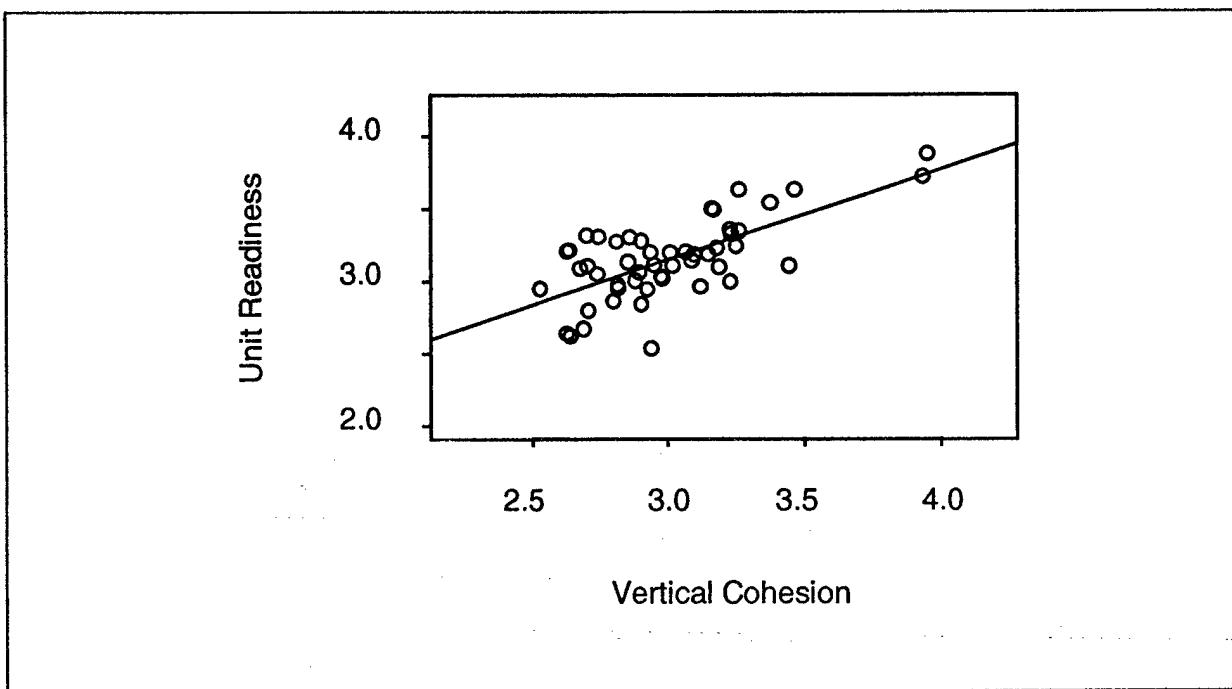


Figure 14. Relationship between mean ratings of unit readiness and vertical cohesion by company-size units.

Summary and Conclusions of the Impact of Technology Changes on Organizational Outcomes

In this section, we examined five indices of organizational effectiveness. Our goal was to determine whether the measures of organizational effectiveness varied as a function of assessment period in the AWE for the experimental 1BCT and if they were different for the 1BCT than they were for the conventional 2BCT. With few exceptions, the results provided no evidence of differences in the five indices of organizational effectiveness across the Baseline, Pre-NTC, and Post-NTC samples. Furthermore, the indices of organizational effectiveness for the 1BCT Pre-NTC sample were similar to or slightly better than identical measures from the comparable 2BCT sample. Consequently, these results suggest that neither the technological changes introduced during the TF XXI AWE nor changes in the work environment caused by the TF XXI initiatives had any major effect on the measured organizational effectiveness outcomes. Instead, the results support the conclusion that soldiers and leaders in the experimental task force adjusted well to the increased work demands placed upon them because of their participation in the TF XXI AWE.

Even the noted exceptions to there being no differences in organizational outcome measures support this conclusion. Both distress levels and intentions to leave the Army decreased significantly between the Pre-NTC and Post-NTC samples for EMs in the 1BCT. Furthermore, in their respective Pre-NTC assessments, EMs in the experimental 1BCT exhibited lower levels of distress and intentions to leave the Army than did EMs in the conventional 2BCT. Taken together, these results suggest that for 1BCT EMs, the presumed adjustment to the rigors of the experiment may have had some over-riding positive after effects. Alternately, the more favorable Post-NTC assessments for the 1BCT EMs may be driven by the fact that especially for EMs, the end of the NTC rotation marked the end of a very stressful period. They could look forward to much fewer sources of distress following the rotation.

The lower levels of distress and intention to leave the Army for 1BCT EMs compared to 2BCT EMs during their respective Pre-NTC assessments may also have two explanations. First, the new technologies issued to the 1BCT soldiers increased their support for their units mission over that shown by the 2BCT respondents. Second, while EMs in both BCTs probably experienced distress induced by their forthcoming NTC rotations, those in the 2BCT knew that there would be significant new sources of work-related distress following their rotation. They knew that they would be expected to perform not only their normal share of work details in garrison but that they would also have to perform some tasks that might otherwise have been assigned to the 1BCT.² There was a generally belief that 1BCT soldiers would be “protected”

² While not an issue in this effort, it must be noted that it appears that commanders and leaders of the 2BCT took appropriate remedial action based upon the information they received in the back brief following their Pre-NTC assessment. In spite of the fact that the average daily work hours in the 2BCT varied only slightly over two subsequent assessments, there were continuous improvements shown in measures of both the work environment and organizational outcomes. For example, distress levels decreased over successive assessments for all rank categories in the 2BCT, but particularly for EMs. In addition, indices of job satisfaction increased and those related to an inclination to leave the Army decreased. The major driver behind these trends appeared to be an increase in reported predictability of work hours and a decrease in work-family conflict over these two Post-NTC assessment intervals for the 2BCT.

from having to do these tasks so they could concentrate on acquiring skills necessary to operate as a “digitized” BCT.

The other exceptions to the general absence of differences in measures of organizational outcome occurred for Officers in the measures taken for their perceptions of job satisfaction and unit readiness. For 1BCT Officers, the perception of unit readiness increased significantly between the Baseline and Pre-NTC assessment periods, perhaps reflecting their increased familiarity and “comfort” with the new initiatives. However, there was a significant decrease in perceived unit readiness and a significant decrease in reported job satisfaction following the NTC rotation, perhaps reflecting their disappointment with the performance of these new initiatives in this capstone event.

In the next section of this report, we examine more directly the perceptions of soldiers and leaders toward TF XXI and how these perceptions may have changed over the course of the AWE.

FINDINGS FOR THE PERCEPTIONS OF THE TF XXI AWE

In this part of the report, we present results that describe the perceptions of soldiers and leaders toward the Army-wide Force XXI program as it was implemented in the TF XXI AWE. There were two parts of the survey specifically designed to assess perceptions of the TF XXI program. Items in the first part asked all respondents to indicate their general familiarity with the Force XXI program and their perceptions of the potential long-term impacts on the Army of the advanced technology. Items in the second part asked for responses from only those soldiers and leaders whose units had actually been issued new equipment. These latter items asked soldiers and leaders with first-hand experiences to indicate their perceptions of new TF XXI equipment and the EXFOR program at Fort Hood.

The results regarding perceptions of TF XXI are organized and presented below in three major sections. First, we report findings for soldier and leader familiarity with the Force XXI program and their perceptions of how it will impact Army capabilities. Second, we describe soldier and leader perceptions of issues related to the new equipment, training, their jobs, and the impact of their participation in the EXFOR program. Finally, we present findings on the perceptions of respondents toward the long-term impact of the Force XXI program on Army-wide personnel issues. As with earlier parts of this report, we focus on differences in perceptions as a function of rank categories and successive assessment periods during the AWE.

Familiarity with Force XXI and Its Impact on Army Capabilities

We first determined how familiar soldiers and leaders were with the Force XXI program at Fort Hood. Respondents were asked to indicate how familiar they were with the EXFOR program using one of following five response categories: Not at all, A little bit, A moderate amount, Quite a bit, and Extremely.

Figure 15 shows the percentage reporting that they were at least moderately familiar with the EXFOR program. While most soldiers and leaders in the experimental task force were at least moderately familiar with the EXFOR program, the level of familiarity varied as a function of the

respondent's rank and the assessment period. The percentage of Officers with at least moderate familiarity with the EXFOR program was reasonably stable over assessment periods (at about 96%) and consistently higher than for NCOs and EMs. The percentage of enlisted personnel reporting at least moderate familiarity was higher for NCOs than EMs and increased for both these groups as a function of assessment periods (from 69 to 78% and from 50 to 65%, respectively). By way of comparison, data collected in January 1997 from Officers, NCOs, and EMs in the non-experimental 2BCT showed that only 78, 41, and 22 percent, respectively,³ indicated they were at least moderately familiar with the EXFOR program.³

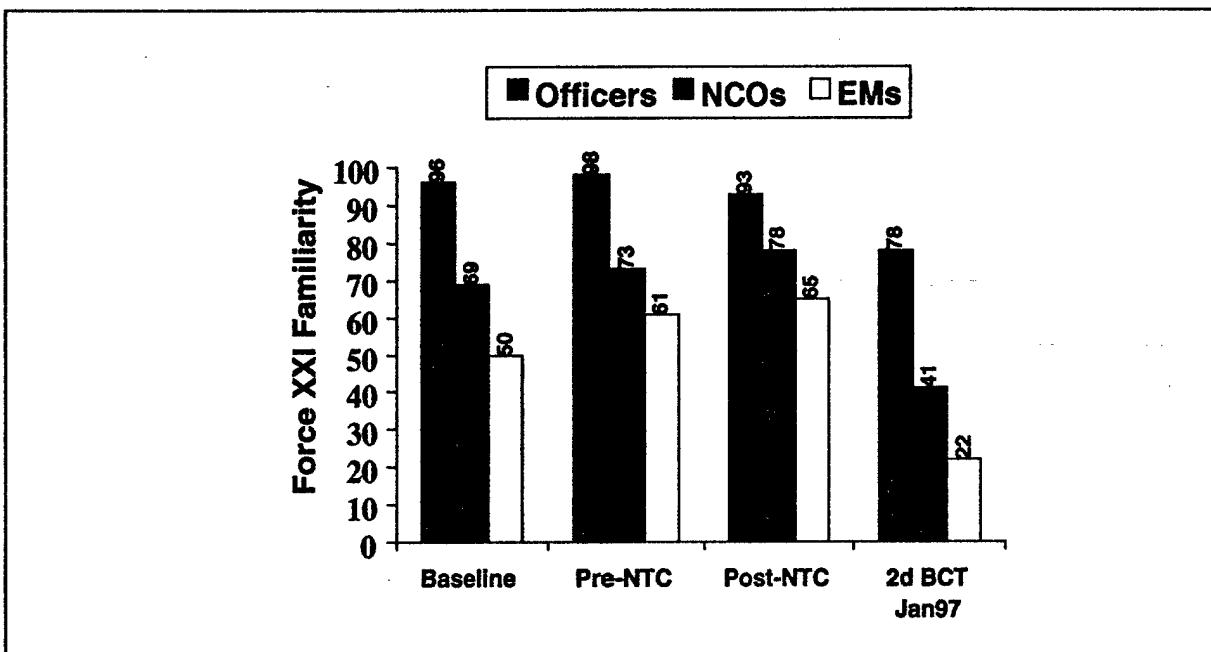


Figure 15. Percentage of respondents reporting at least moderately familiar with the EXFOR program.

Since familiarity with the EXFOR program by 1BCT respondents generally increased as a function of successive assessment periods, it would be valuable to examine how their perceptions of the possible impact of Force XXI technologies differed over samples. We examined their responses to four items concerning Army capabilities. The items asserted that the long-term impact of advanced technology would increase: (a) the Army's ability to find and destroy the enemy, (b) the speed at which decisions would be made and executed, (c) the Army's ability to

³The January 1997 data collection period for both BCTs is used to compare familiarity with the Force XXI program by members of the experimental 1BCT and the non-experimental 2BCT. By this time period, members of both BCTs had been given the opportunity to gain at least some familiarity with the new equipment. Members of the 1BCT acquired familiarity directly as a result of their experience as members of TF XXI. Members of the 2BCT acquired familiarity more vicariously through their participation as members of the opposing force and as observers/controllers during TF XXI training, as well as through informal discussions that occurred with members of the 1BCT.

provide combat service support (CSS) to the force, and (d) the Army's ability to survive in the battlefield.

On average, the majority of 1BCT respondents agreed with the positive assertion made by each of these items, regardless of the assessment period or the respondents' rank. There were, however, interesting variations in both absolute and relative levels of agreement. For NCOs and EMs, the overall level of agreement did not vary over these four survey items or as a function of assessment period. On average, 61 percent of the NCOs and 52 percent of the EMs agreed or strongly agreed with each of these statements.

In contrast, the level of agreement to these four items by Officers showed some noticeable variation across items and assessment periods. The results obtained from Officers for these four survey items are summarized in Figure 16. Officers agreed that the new technology would increase the Army's ability to find and destroy the enemy (Item 1) 84 percent of the time in all three assessment periods. The percentage of Officers who agreed with Item 2 (improve decision making) was lower in the Baseline sample (74%) than in the Pre-NTC and Post-NTC samples (85% in both samples). The opposite trend in levels of agreement was found over successive samples for Item 3 (improve CSS): the percentage of Officers who agreed with Item 3 was higher in the Baseline and Pre-NTC samples (about 73%) than in the Post-NTC sample (58%). Finally, with Item 4 (improve ability to survive), more Officers agreed during the Pre-NTC phase (82%) than in either the Baseline or Post-NTC samples (about 74%).

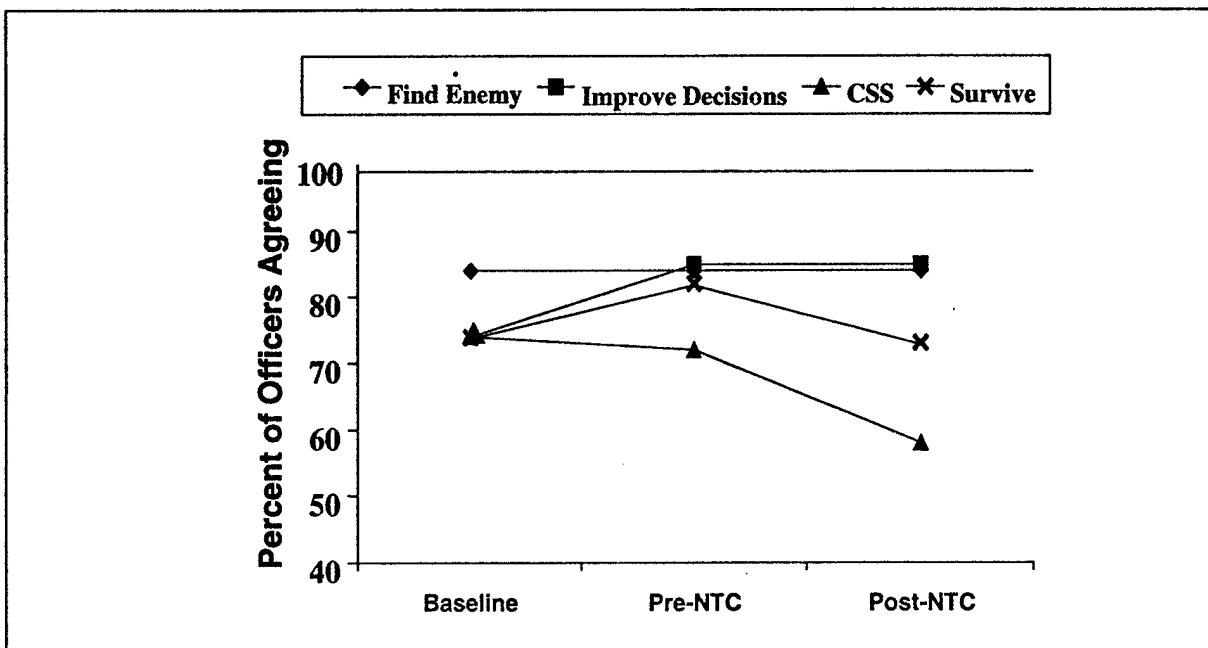


Figure 16. Percentage of 1BCT Officers agreeing that advance technology will have positive impacts on Army capabilities.

Taken together, responses to the item on familiarity and the four items on long-term benefits to the Army indicate that both soldiers and leaders were generally familiar with the EXFOR program at Fort Hood and believed that the new technology associated with the program would

enhance the ability of the Army to successfully perform its mission. The fact that Officers' levels of agreement with some of the promised benefits of the program varied over successive samples during the AWE may be the result of their mixed levels of experience with different new technologies or with different uses of the same technologies.

Perceptions of New Equipment, Training, Job Characteristics, and Participation

Only respondents who had been issued new high technology equipment as part of the EXFOR program⁴ were asked to respond to a series of survey items covering their perceptions of (a) the new equipment, (b) the training they received on that equipment, (c) the impact of the new equipment on their jobs, and (d) the extent to which their participation in the EXFOR program might have had any positive impacts on them or their units. Succeeding sections of this report present the results obtained from responses to these categories of surveys items.

EXFOR equipment. Two survey items directly but generically addressed respondents' perceptions of the new TF XXI equipment. The percentage of respondents who agreed with an item that asserted that the new equipment was reliable varied as a function of both rank and assessment phase. The percentage of Officers, NCOs, and EMs who agreed that the equipment was reliable increased monotonically from 6, 16, and 12 percent, respectively, in the Baseline phase to 35, 32, and 21 percent, respectively, in the Post-NTC phase. These generally low values suggest that respondents had a concern about the reliability of the new equipment. This concern about system reliability was reflected also in a second item that asserted that the new equipment would have to be significantly improved over the next few years. The percentage of Officers, NCOs, and EMs who agreed with this item was 86, 69, and 59, respectively, and did not vary over successive assessment periods.

A third item in this section of the survey assessed whether respondents felt that the new equipment issued to them would lead to significant positive changes in the Army. Figure 17 shows the results obtained for this item. Notice that the percentage of EMs indicating agreement with this statement was relatively constant over the three phases (at approximately 36%). For Officers and NCOs, however, agreement with this item was higher than for EMs at Baseline (56 and 42%, respectively) and it was even higher in the subsequent assessment periods (at about 72 and 50%, respectively). It is important to note that the percentage of respondents who agreed that the new equipment would lead to significant positive changes in the Army is generally lower than the percentage of respondents who agreed that the Force XXI program would have *long-term* benefits to the Army (see previous section). This difference most likely reflects the respondents' belief that the currently available prototype systems would be improved over the long-term course of the Force XXI program.

⁴ On the average but varying slightly as a function of assessment phase, about 87, 72, and 68 percent of the 1BCT Officers, NCOs, and EM, respectively, indicate they or their units had been issued new Force XXI equipment. Since respondents from the 2BCT had not been issued equipment associated with TF XXI and did not participated directly in the TF XXI program, their perceptions toward that equipment and its impacts were not assessed.

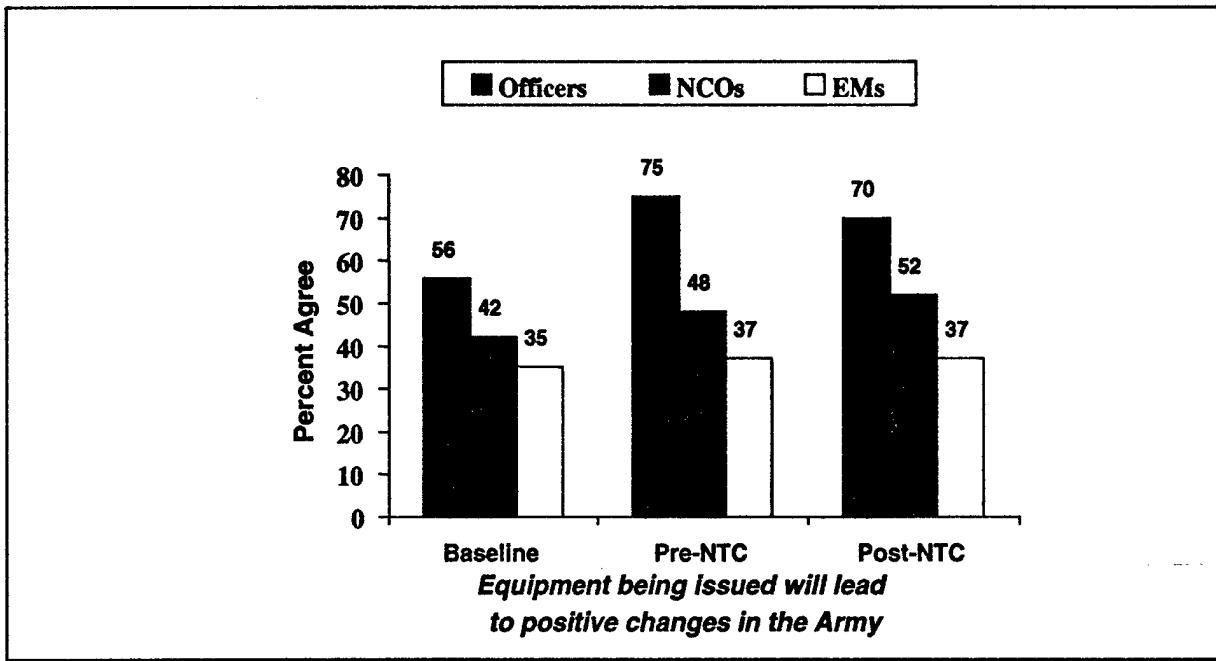


Figure 17. Percentage of respondents agreeing TF XXI equipment will lead to positive changes.

Adequacy of training on the new equipment. Three items addressed generally the perceived adequacy of training received on the new equipment. The first item addressed the adequacy of individual training for operating the new equipment. The second addressed the adequacy of collective training for unit-level performance with the equipment. The third item addressed the adequacy of individual training for maintaining the new equipment.

Figure 18 shows the percentage of respondents who agree that training was adequate for individual operators and unit-level performance. Notice that agreement with these two statements increased as a function of rank and assessment phase. Officers showed a greater increase in agreement over successive samples during the AWE than NCOs, and NCOs showed a greater increase over successive samples than EMs. It is also important to note that increases in perceptions of training adequacy were greatest between the Baseline and Pre-NTC assessment periods, especially for unit training. Finally, the data in these two figures show that training was perceived to be more adequate for individual training than for unit-level training by all rank categories and at all three assessment periods.

Taken together, these results for the adequacy of operator and unit training clearly reflect the influence of the training ramp up for the NTC rotation. Operator training began immediately and continued throughout the AWE. Unit-level training began in earnest only in the two to three month period prior to the Pre-NTC assessment. The adequacy of the training received during the NTC rotation itself (and reflected in the Post-NTC assessments) was judged quite favorably, even though it could have been adversely affected by other mission considerations at the NTC.

The perceived adequacy of new equipment maintenance training also increased over successive assessment periods (from 25% to 31%). However, the absolute levels of perceived

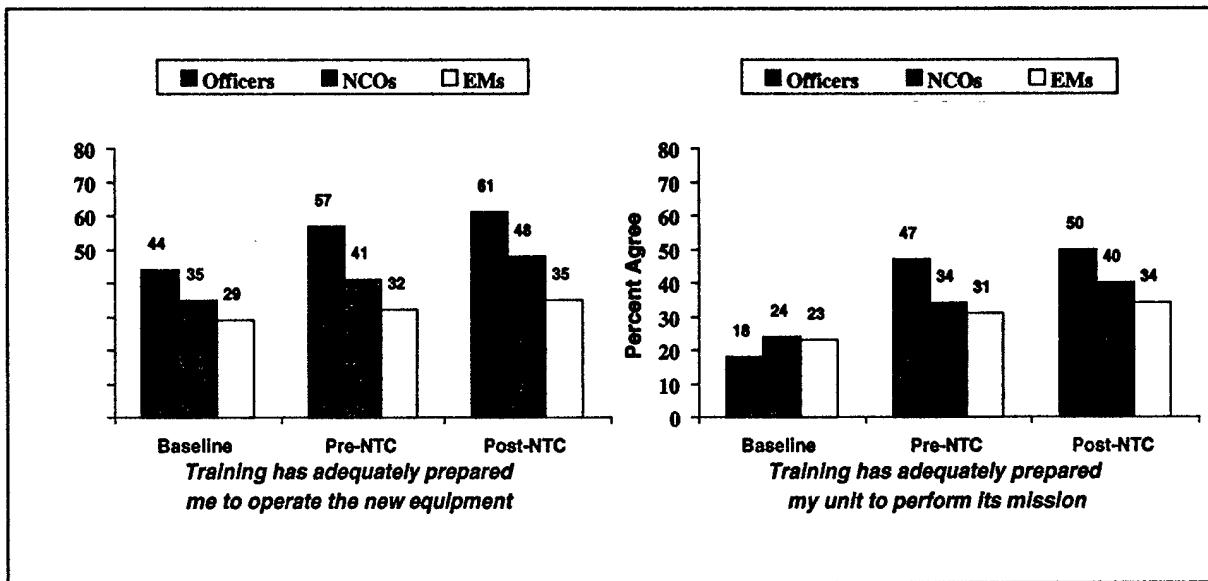


Figure 18. Percentage of respondents agreeing that operator and unit training were adequate.

adequacy for maintenance training was generally not as high as it was for operator and unit-level training, and there were no systematic differences in responses by rank. These data for maintenance training reflect the realities of new equipment training. In short, maintenance training was generally not provided to the soldiers and leaders in the task force. Civilian contractor support was used to address problems that occurred with the equipment during operations and to provide necessary maintenance support.

Regarding maintenance support by civilian contractors, an average of 39 percent of the respondents agreed with a statement in the survey that assessed whether an expert was available to help if questions arose about the new equipment. The level of endorsement for this item varied as a function of rank (57%, 45% and 34% for Officers, NCOs and EMs, respectively). While essentially constant over successive assessment phases for NCOs and EMs, it increased from 36 to 65 percent for Officers between Baseline and Pre-NTC phases of the effort and then dropped back to 58 percent at the Post-NTC assessment. The lower value obtained for the Post-NTC phase probably reflects the difficulty of providing civilian experts to address equipment problems while the units were at NTC.

Impact of new technology on the jobs of soldiers and leaders. Five items in the survey were concerned with the impact of the new equipment on the jobs of soldiers and leaders. Three of these items specifically addressed whether the new technology affected characteristics of the job. The other two items assessed whether the new equipment was perceived as enhancing job performance and job satisfaction.

Figure 19 shows that most respondents agreed that the new equipment would directly affect the characteristics of their jobs (a) by increasing the amount of information they would have to handle, (b) by increasing the complexity of their jobs, and (c) by giving them more responsibility. In each assessment period, a greater percentage of Officers agreed with these three statements than did NCOs or EMs. Likewise, in each assessment period, a greater percentage of NCOs than EMs agreed with the items.

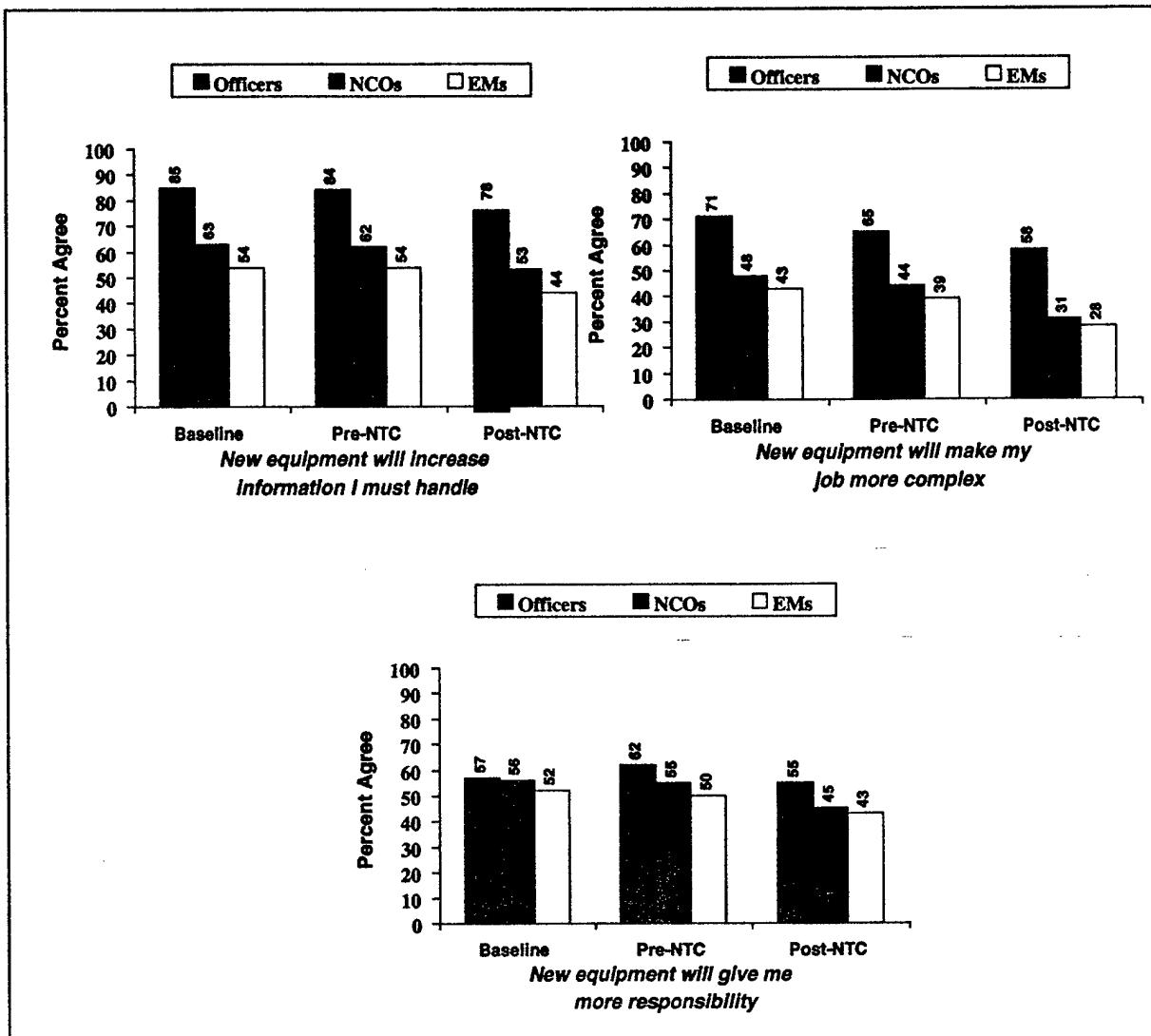


Figure 19. Percentage of respondents agreeing that new technology would impact their jobs.

Across assessment phases and ranks, the highest levels of agreement on how the new equipment would change jobs occurred in terms of increases in information handling requirements. For Officers, the second highest level of agreement occurred for increases in job complexity, and the third was for increases in job responsibility. The order of these latter two potential changes in job characteristics was reversed for NCOs and EMs: more NCOs and EMs agreed that their job responsibility would increase than that their jobs would become more complicated.

It is important to note that while always relatively high, there was for all rank categories a decrease over successive assessment periods in the percentage of respondents agreeing that the new equipment would cause changes in these three job characteristics. Hence, continuing involvement in the EXFOR program is associated with a smaller percentage of respondents indicating that their jobs would require more information handling, would become more complicated, and would give them more responsibility. The decrease in impact on job

characteristics over assessment periods was greatest for job complexity and least for job responsibility.

Figure 20 shows the percentage of soldiers and leaders who agreed with the item concerning the potential impact of the new equipment on job performance. Notice that an overwhelming majority of Officers and a greater percentage of NCOs than EMs agreed that the new equipment would enhance their job performance. The levels of endorsement for this item tended to increase over successive assessment phases for all ranks of respondents. Officers agreement with this item showed a dramatic increase between the Baseline and Pre-NTC assessment periods.

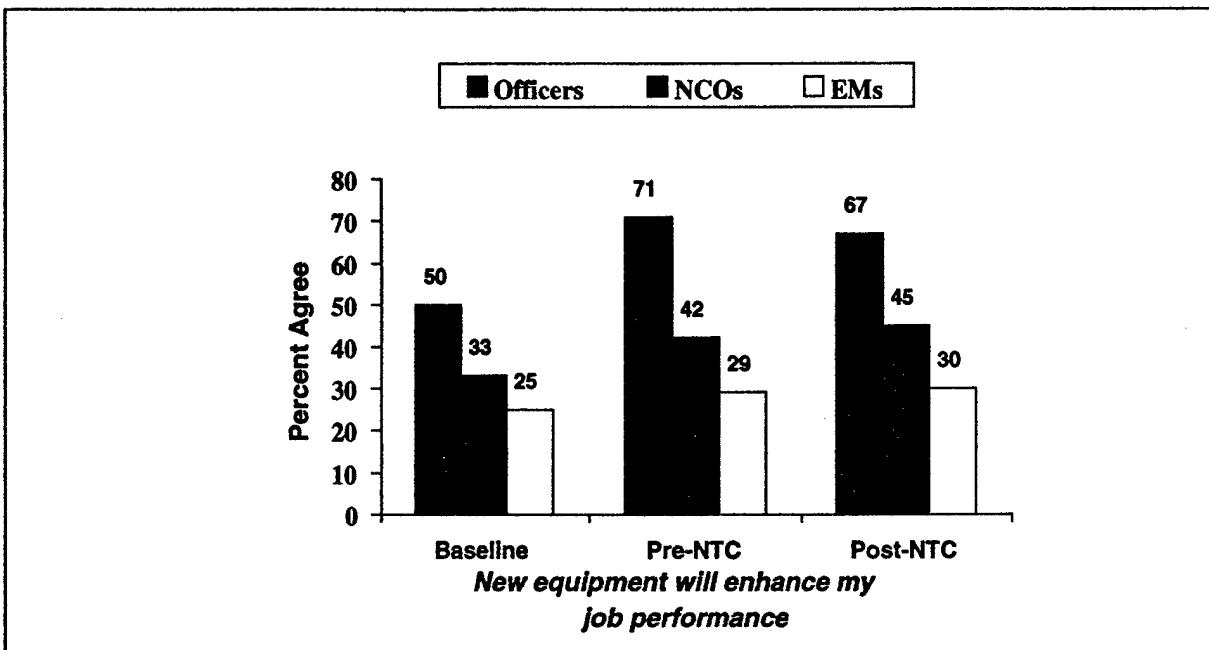


Figure 20. Percentage of respondents agreeing that new technology would impact their job performance.

The generally high levels of agreement on the positive impact of the new equipment on job performance stand in stark contrast with those obtained for another item which asserted that the new equipment would increase job satisfaction. This latter item yielded the lowest levels of agreement of any item in this section of the survey. Over assessment phases, agreement levels for this item were only 23, 20, and 16 percent respectively, for Officers, NCOs, and EMs. There was, at best, only a very slight variation in the percentage of agreement to this item over assessment phases.

Two interpretations of the job satisfaction data are possible. On the one hand, it has already been noted and shown in Figure 10 (in the Organizational Outcome section) that respondents have generally positive perceptions toward job satisfaction. Perhaps it is unreasonable to believe that the new equipment and the potential for enhanced levels of performance would produce still further increases in job satisfaction. On the other hand, the results may simply indicate that while respondents expect to perform better with the new equipment (as shown in Figure 20), they do not necessarily believe that the new equipment will make them more satisfied with their jobs.

Impact of participating in the EXFOR program. Several items assessed directly the potential impact of participation in the EXFOR program on the respondents or their unit. The lead in to each of these items asserted that participation in the program had a positive impact. The results obtained with three of these items exhibited noteworthy effects. In general, the percentage of respondents agreeing with each of these items was greater than the percentage disagreeing with the item. These three items addressed personal sense of accomplishment and pride; ability to perform current job; and unit's readiness to operate. The results obtained are shown in Figure 21.

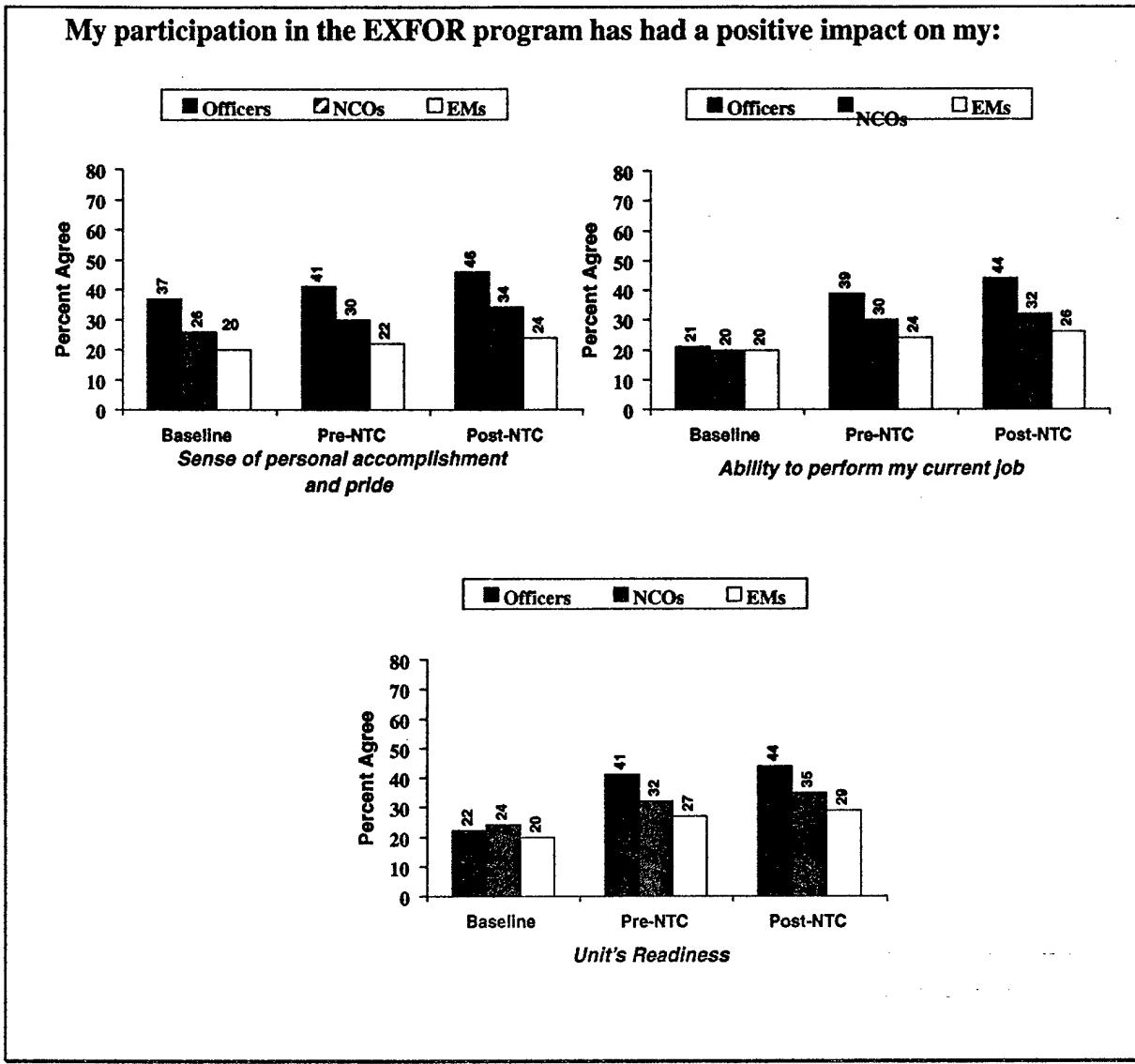


Figure 21. Percentage of respondents agreeing that participation in the EXFOR program had a positive impact on them and their unit.

It may be seen that the percentage of respondents agreeing with each of these items varies directly as a function of rank and assessment phase. Overall, EMs show the least amount of agreement with these statements and show the smallest change over assessment phases (over all

three items and all three assessment phases the average EM level of agreement was 24%). In the Baseline assessment period an average 23 percent of the NCOs indicated agreement with these three items but in subsequent assessment samples the average level of agreement of NCOs increased to 34 percent. Officers generally agreed more with each of these statements and Officer samples reflected a greater increase in agreement over the AWE than did NCOs. Over all three phases, 41 percent of the Officers agreed with the item addressing a sense of accomplishment and pride and about 34 percent with both of the other two items. Officers had monotonically higher average levels of agreement to all three items as a function of assessment phase. The average level of officer agreement in the Baseline phase was 27 percent and in the Post-NTC phase, it was nearly 45 percent.

In summary, the results exhibited in Figure 21 show that as the length of their participation in the EXFOR program increased, NCOs and, even more so, Officers reported a higher sense of personal accomplishment and pride with being part of the program. This increasing sense of pride among Officers and NCOs with being part of the EXFOR program is especially significant when compared to the results described above that showed no increase in job satisfaction resulting from the new equipment *per se*. Over the course of the AWE, Officers and NCOs also indicate that they increasingly believed that their participation in the program would have a positive impact on their ability to perform their current jobs and on their units' readiness to perform their missions.

Summary of the perceptions of new equipment, training, job impacts, and participation. Most respondents indicated that the new equipment was not as reliable as ultimately necessary. However, the results over successive samples suggested the equipment was getting better and was leading to positive changes for the Army. In part, the more positive perceptions later in the AWE may have been due to actual improvements that were being made to some items of new equipment over the course of the AWE. In part, these perceptions of the respondents were also the result of the continuing training provided to them on how to operate the equipment and to use the information it provided.

The respondents generally agreed that the individual operator training and unit-level training they received was adequate or at least becoming more adequate. The levels of agreement to these training items began at rather modest levels in the Baseline assessment period but increased considerably by the Post-NTC assessment period. The respondents also generally agreed that the nature of their jobs would change as a result of the new equipment. They indicated their jobs would require handling more information, would become more complex, and would give them greater levels of responsibility. The percentage of respondents agreeing that these changes would occur in their jobs was high in the Baseline assessment, and, while still high in the Post-NTC assessment, the level of agreement decreased steadily over successive samples during the AWE.

While the nature of their jobs were perceived to change in what some might consider to be a negative manner, the respondents also generally agreed that their levels of job performance would increase. This perception of enhanced performance because of the new equipment began at relatively low levels in the Baseline sample and increased steadily over successive samples. Finally, over the course of the AWE there was an ever increasing percentage of respondents indicating they believed their participation in the EXFOR program would increase their sense of pride at being part of it, would increase their job performance, and increase the readiness of their units.

In short, virtually all of the items used to assess the perceptions of soldiers and leaders toward their TF XXI experiences indicated that as they became more familiar with the new equipment, they appeared to be less threatened by it, and appreciated more the positive impact it would have on them, their units, and the Army as a whole. The one item in the survey that did not produce results in conformity with this otherwise common trend was the one that proposed the new equipment would increase their levels of job satisfaction. This item gained very low levels of endorsement at every assessment period. It is not clear in these perception data if this lack of endorsement was due to the fact that their job satisfaction levels were already so high that there was little room for improvement in this index, or if collateral aspects of new technology insertion process (e.g., high levels of work hours and work-family conflict) counteracted or negated the expected increases in job satisfaction.

Perceptions of the Long-Term Impact of Force XXI on Army Personnel Issues

Eight survey items were concerned with long-term impacts of the Force XXI program on Army-wide personnel issues. Three of these items address long-term personal and training impacts; three items address issues related to the Army's need to retain qualified soldiers and leaders, and two items address recruitment issues. The following paragraphs address the results obtained for these three categories of long-term impacts.

Long-term personal and training impacts. Three statements asserted that the long-term impact of the Force XXI program would: (a) allow soldiers more personal time to spend with families and friends; (b) reduce the time required for field training, and (c) require more extensive training of soldiers of all grades and ranks. The results clearly show that only a small percentage of respondents agreed with the first two of these statements (a large majority disagree with the items) and a very large majority agreed with the third. These effects were relatively constant over the three assessment periods but did vary as a function of the respondent's rank category. For Officers, NCOs and EMs, respectively, the results are as follows: (a) for more personal time for family and friends, 6, 12, and 14 percent agree (and 70, 59, and 54% disagree); (b) for reduce time for field training, 6, 16, and 18 percent agree (and 82, 56, and 52% disagree); and (c) for more extensive training, 92, 75, and 63 percent agree.

Long-term impacts on retention. Three items asserted that the long-term impact of TF XXI would: (a) provide soldiers with more opportunities to enhance their Army careers; (b) give soldiers skills that help them get good jobs after they leave the Army; and (c) encourage soldiers to stay in the Army until retirement. A large number of respondents agreed with each of the first two items. The respondents generally reported that Force XXI would be good for soldiers' job opportunities (whether in or out of the Army). However, while the percentage of agreement for the first item (i.e., good for Army careers) was equal and constant over assessment periods for NCOs and EMs (at about 38%), Officers agreed with the item more than the enlisted personnel and increasingly so over successive assessment periods (41, 46, and 52%, respectively). For the second item (i.e., good for post-Army jobs), there were no differences in levels of agreement as a function of assessment phase. There also was no difference between NCOs and EMs (39%), but Officers agreed more than either category of enlisted personnel (61%). For the third item, there was no effect of assessment phase or for rank category. Overall, very few respondents (13%) agreed and a large number (42%) disagreed with the assertion that Force XXI would encourage soldiers to stay in the Army.

Recruitment impacts. Two items stated that the long-term impact of the Army-wide Force XXI program would: (a) make it more important for the Army to recruit high quality soldiers, and (b) make it easier for the Army to recruit high quality soldiers. The obtained levels of agreement with these two items did not differ as a function of assessment periods. There was general agreement on the importance of recruiting high quality soldiers. Levels of agreement for this item varied as a function of rank (78, 52, and 46% agreement for Officers, NCOs, and EMs, respectively). On the other hand, there was a high level of equivocation in perceptions of the ability of the Army to meet this objective. About equal percentages of respondents in the NCO and EM samples agreed (27%) and disagreed (26%) with the assertion that the Force XXI program would be easier to recruit high quality soldiers. Officers were less equivocal, agreeing with the statement twice as much as they disagreed with it (32 and 16%, respectively).

Summary of perceptions of long-term impacts on Army-wide personnel issues. Clearly, the soldiers and leaders of TF XXI expressed the belief that the Force XXI program would lead to increase training requirements across the Army but, at a minimum, no improvements in personal or family time. The respondents generally, and Officers in particular, also indicated that the Force XXI program would open up new jobs and new career opportunities for soldiers, both within the Army and after separation from the Army. These respondents also stood together in rejecting the notion that Force XXI would create an environment that would keep soldiers in the Army until they retired. Finally, while most respondents agreed that the Force XXI program would increased the need to recruit high quality soldiers, they did not generally accept the proposition that the new technology would make it easier to get these high quality soldiers.

Taken together, the responses obtained to these items strongly suggest that special attention should be directed toward the impact of Force XXI technology on Army-wide personnel programs and policies. The respondents perceived that the new knowledge, skills, and attitudes acquired by soldiers and leaders may enhance Army careers, but they also perceive that these same attributes will increase career opportunities in the civilian sector. Furthermore, perhaps because of the perceived need for more extensive training with no increase in family time, there is a general perception that there will be no increase incentive for soldiers and leaders to stay in the Army or for new high quality personnel to be open to recruitment into the Army.

OVERALL SUMMARY OF THE FINDINGS

This research product summarizes human dimensions data collected during the TF XXI AWE and subsequently back briefed to commanders and leaders of the EXFOR. The report therefore provides an initial assessment of the human dimensions aspects of programs that insert or implement information technology and related initiatives into U.S. Army organizations. This overall summary of the findings of the effort is presented in terms of the impact of the TF XXI AWE initiatives on (a) global measures of the work environment and organizational outcomes and (b) specific measures of the perceptions and long-term expectations of TF XXI participants. In addition, findings are summarized on the mediating role of the rank category of TF XXI participants.

Global Measures of the Impact of TF XXI Initiatives on Human Dimensions

The AWE initiatives were expected to impact the work environment by increasing three measures of the workload experienced by TF XXI participants and a measure of the perceived significance of the unit's missions. Based on prior research with these measures, we expected increases in workload to have deleterious effects on measures of organizational outcome. On the other hand, we expected increases in the meaningfulness or the significance of the unit's mission to be associated with increases in these same measures of organizational outcome.

The findings show that while work hours and work-family conflict increased over the course of the AWE for soldiers and leaders in the TF XXI, there were generally no corresponding differences in the organizational outcome measures. Furthermore, while participants in the TF XXI AWE reported higher levels of work hours and work-family conflict than their counterparts in the control 2BCT, their measures of organizational outcome were no different from or slightly better than those of the control group. We attribute the absence of a relationship between these two measures of workload and the five measures of organizational outcome to two other findings. First, direct ratings of workload by participants in the TF XXI AWE indicated they experienced no or, at most, low levels of work overload. We interpret these findings as an indication that while they were required to work long hours, they believed the work to be performed was well within their capabilities. Second, participants in the TF XXI AWE generally reported high levels of support for their unit's missions, levels higher in their Pre-NTC assessment period than those reported by their counterparts in the control 2BCT. Together, the absence of experienced work overload and the heightened support for their unit's missions would tend to enhance organizational outcomes. This positive effect on organizational outcomes could, in turn, offset any negative effects that could be caused by the long work hours and heightened levels of work-family conflict.

Specific Measures of the Experiences and Perceptions of TF XXI AWE Participants

A number of individual survey items were developed and used to assess specific aspects and consequences of the TF XXI initiatives. These specific survey items were administered only to those participants who had actually received new equipment associated with the AWE. Some of these specific items were directed at the actual experiences participants had with the initiatives. Others were directed at the participants' expectations for longer-term impacts of the initiatives. The overall findings of these two classes of specific measures are summarized in succeeding subsections.

Perceptions of TF XXI initiatives derived from participation in the AWE. The trends in most measures of soldier and leader perceptions of their TF XXI experiences were quite consistent over successive samples in the AWE, i.e., from Baseline to Post-NTC assessment intervals. The findings show that over the course of the AWE participants increasingly agreed that the new equipment was getting more reliable, training to operate the new equipment was becoming more adequate, and the new equipment was enhancing their job performance. Furthermore, over the course of the AWE, perceptions of the impact of the new technology on several job characteristics changed in a generally positive direction. Finally, participants in the TF XXI AWE increasingly agreed over the course of the AWE that the program was having a

positive effect on their sense of personal accomplishment and pride, their ability to perform their job, and in their unit's readiness to perform its mission.

To reiterate, the trends in perceptions of soldiers and leaders for the just cited list of TF XXI attributes seem to all be in a positive direction: from average, not so good, or even bad experiences toward better experiences. We attribute these trends in the data to the moderating effects of two factors. First, in some cases, the reliability of the new equipment actually improved over the course of the AWE (e.g., new improved versions of software were made available). Second, because of continuing training opportunities, the TF XXI AWE participants became more familiar with the new equipment and how it was to be used.

The one item in the survey that did not produce results in conformity with this otherwise common positive trend was one that proposed the new equipment would increase levels of job satisfaction. This item received very low levels of endorsement in every assessment period. It is not clear if the lack of endorsement for this particular item was due to the fact that levels of job satisfaction were already so high that they could not be further increased, or if collateral aspects of new technology insertion process (e.g., high levels of work hours and work-family conflict) actually reduced levels of job satisfaction.

Expectations for long-term impacts of the TF XXI initiatives. The majority of TF XXI respondents indicated they believed that the new technology associated with the program would enhance the ability of the Army to successfully perform its operational missions. However, these same respondents also endorsed the belief that the insertion of new information technologies into the force would increase training requirements across the Army and would degrade or, at a minimum, not improve the time available for addressing personal or family affairs. The respondents generally indicated that the insertion of new technologies would open new jobs and new career opportunities for soldiers, both within the Army and after separation from the Army. However, they stood together in rejecting the notion that the new technologies would create an environment that would keep soldiers in the Army until they retired. Finally, while most respondents agreed that the insertion of new technologies would increase the need to recruit high quality soldiers, they did not generally accept the proposition that the new technology would make it easier to get these high quality soldiers.

Effect of Respondents' Rank on Perceptions and Expectations of TF XXI Impact

Large and consistent differences were generally found for most measures as a function of the three rank categories used to partition respondents. Whether the finding represented positive results (e.g., job satisfaction,), negative results (e.g., work overload), or neutral or indeterminate results (e.g., job characteristics), Officers were associated with a greater level of the finding than NCOs, and NCOs with a greater level than EMs. If there were differences in the findings as a function of successive samples over the AWE, these differences over time were generally greater for Officers than NCOs, and greater for NCOs than for EMs. These results due to the rank category of the respondents are not surprising. The technological changes introduced in the AWE are designed to impact performance associated with planning and decision-making processes. Operational planning and tactical decision-making processes have not generally been considered characteristics of the jobs of EMs. These processes are associated with command, control, communication, and intelligence (C3I) functions on the battlefield. Typically, C3I

functions are the responsibilities of and are performed by officers and senior NCOs in the various units. It is therefore to be expected that the innovations associated with the TF XXI AWE would have the greatest impact, whether positive or negative, on Officers followed generally by NCOs. It could be argued that these innovations would have minimal impact on the jobs performed by junior enlisted personnel. Indeed, the jobs performed by many junior EMs are probably not directly impacted by the TF XXI initiatives.

CONCLUSIONS

The long hours of work and the evidence of work-family conflict and psychological distress that are found in all three assessment periods for 1BCT Officers and NCOs distinguishes them from their counterparts in the 2BCT. (Recall that in spite of continuing long hours of work over the three assessment intervals, respondents in the 2BCT report decreasing levels of distress and work-family conflict.) Thus, it could be argued that in spite of 1BCT respondents' belief in their capabilities to perform the work required of them and in spite of their belief that their unit's missions were meaningful, their participation in the TF XXI AWE had some undesirable negative consequences that might have been avoided. It might be argued that these negative impacts could be associated with and be a consequence of the requirement to complete the TF XXI AWE in a relative short span of time. One can but speculate on the human dimensions consequences if more time were available for the AWE. More available time could have been used to further increase and stabilize system reliability; increase the adequacy of training; more thoroughly develop new tactics, techniques and procedures; and increase the integration of newly acquired participant skills and roles. More available time could have been used to reduce work hour requirements and work-family conflicts. The findings of this effort showed that the perceived status of these latter two factors were still deteriorating while other relevant human dimensions (e.g., perceptions of training adequacy, job performance, and unit readiness) were still improving at the conclusion of the AWE.

A generally accepted fact from the study of human behavior is that desired changes in the attitudes, knowledge, and behaviors of individuals and groups within an organization are often very difficult to achieve. If they are ever achieved, it is generally only with great effort and over extended periods of time. This fact is supported in a recently published report by Dodge, Webb, and Christ, (in preparation). That report presents results about the process and effects of information technology insertion from an analysis of the management science and business literature. The report stresses the importance of the human dimensions in determining organizational outcomes and in mediating the long-term effects of information technology. Moreover, that report notes that the process by which organizations adapt to information technology is not linear and takes time (generally more than five years) before stable results emerge. This is not a surprising or novel conclusion. To paraphrase an observation made by one senior officer associated with the EXFOR program, "It is relatively easy to make great leaps forward in the levels of technology inserted into and available in an organization, but (people don't make great leaps forward.) Authors translate the latter portion of this comment as follows: it is very difficult to make great leaps forward in the human dimensions necessary to successfully utilize these advanced technologies."

The potential human dimensions difficulties associated with the insertion of technology into an organization are, however, manageable. In relating the results of their analysis of the management and business literature to the Army's digitization program, Dodge et al. (in preparation) note that commanders and their staffs at all levels are in a unique position to shape their subordinates interaction with the technology and to develop accurate impressions of the level of fit between the technology and the human dimensions within their organizations. We believe the results of this human dimensions assessment of the TF XXI AWE demonstrate that leaders of the EXFOR program were quite successful in their management of factors affecting the human dimensions of the AWE. This is especially true given the short timeline available for the AWE and the largely prototype status of many of the systems that were generally being employed for the first time in an operational unit.

As to long-term human dimensions impacts of the Force XXI program, the expectations of participants in the TF XXI AWE support the conclusion that the implementation of information technologies will enhance Army operational capabilities and provide major benefits to the soldiers and leaders trained to use and work with the high technology initiatives. However, these TF XXI participants also expect that these payoffs will incur a cost to both the soldier and to the Army as a whole. If these types of expectations prove to be true over forthcoming phases of the Force XXI program, it must be concluded that that special attention should be directed toward the impact of advanced technology implementation on Army-wide personnel programs and policies.

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APPENDIX A

This appendix contains a copy of the survey instrument used to collect data for the Human Dimensions Assessment of the Task Force XXI Advanced Warfighting Experiment. The original instrument, printed on 8 ½ x 11 inch Trans-Optic ® forms (Form Number 75020-5-72) provided by National Computer Systems, Inc., has been reduced in size by 95 percent for the purpose of inserting it into the appendix.

4th Infantry Division Survey

Walter Reed Army Institute of Research
Washington, DC 20307-5100
and the
U.S. Army Research Institute
for the Behavioral and Social Sciences
5001 Eisenhower Avenue
Alexandria, VA 22333-5600

1. PURPOSE

The U.S. Army is currently involved in a force modernization program with the 4th Infantry Division(4ID). This program may create unanticipated positive and negative effects on soldiers and their families. In order to identify and measure the impact of these possible effects, the Walter Reed Army Institute of Research (WRAIR) and the U.S. Army Research Institute (ARI) are conducting a survey of 4th ID soldiers. The purpose of this survey is to gather information about soldiers' perceptions of the possible effects of the modernization program in the 4th ID.

2. PRIVACY

Under NO CIRCUMSTANCES will any information identifying individuals be released to anyone. The staff of the WRAIR and ARI will combine your answers with those of many others to report how different groups perceive the possible effects of the modernization program in the 4th ID.

Your participation in this survey is voluntary, and you will not be penalized should you decide not to respond. You may skip any questions to which you object, but please answer questions honestly.

3. DISCLOSURE

I consent to the use of my answers by the staff of the Walter Reed Army Institute of Research and the U.S. Army Research Institute to compile statistics of group data. I understand that I have the right to withdraw my consent to participate in this study at any time.

Name (Print)

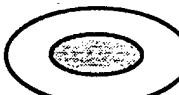
Date

Signature

4. AUTHORITY

10 United States Code Sections 136 and 5; U.S.C. 552a; Executive Order 9397

Please use a #2 pencil and fill in the bubble which corresponds to your answer. Please be sure to fill in the middle of the bubble like the example below.
You do not need to fill in the whole bubble.
PROPER MARK:



SOCIAL SECURITY NUMBER Please write the numbers in the boxes and fill in the bubbles below.

--	--	--	--	--	--	--	--	--	--

0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

In the last 6 months, how often have you deployed on training exercises lasting more than 2 weeks?

0	3	6
1	4	7
2	5	8 or more

What is your current MARITAL STATUS?

Single	Divorced
Married	Other
Legally Separated	

GENDER:

Male
Female

Highest level of CIVILIAN EDUCATION?

Some High School
High School Diploma/GED
Vocational/Technical Diploma
Associates Degree
College Graduate (4 years)
Graduate Degree

Number of CHILDREN living at home:

0	1	2	3	4	5+

Please indicate YOUR UNIT:

Battalion/Squadron

Company/Battery/Troop:

Platoon:

Section/Squad/Crew:

Primary MOS/SSI:

--	--	--	--	--

Are the majority of your duties related to your primary MOS?

yes
 no

ETHNIC GROUP :

<input type="radio"/>	White
<input type="radio"/>	African American
<input type="radio"/>	Hispanic
<input type="radio"/>	Asian
<input checked="" type="radio"/>	Multi-racial
<input type="radio"/>	Other

RANK/GRADE:

E	<input type="radio"/>	1
O	<input type="radio"/>	2
WO	<input type="radio"/>	3
	<input type="radio"/>	4
	<input type="radio"/>	5
	<input type="radio"/>	6
	<input type="radio"/>	7
	<input type="radio"/>	8
	<input type="radio"/>	9

How long have you been in your current unit?

<input type="radio"/>	0-3 months
<input type="radio"/>	4-6 months
<input type="radio"/>	7-12 months
<input type="radio"/>	13-18 months
<input type="radio"/>	19-24 months
<input type="radio"/>	More than 2 years

AGE (last birthday):

<input type="radio"/>	<input type="radio"/>	
1	<input type="radio"/>	0
2	<input type="radio"/>	1
3	<input type="radio"/>	2
4	<input type="radio"/>	3
5	<input type="radio"/>	4
6	<input type="radio"/>	5
	<input type="radio"/>	6
	<input type="radio"/>	7
	<input type="radio"/>	8
	<input type="radio"/>	9

YES

<input type="radio"/>	Vietnam
<input type="radio"/>	Grenada (Urgent Fury)
<input type="radio"/>	Panama (Just Cause)
<input type="radio"/>	Persian Gulf Region (ODS)
<input type="radio"/>	Florida (Hurricane Andrew)
<input type="radio"/>	Somalia (Restore Hope)
<input type="radio"/>	Haiti (Uphold Democracy)
<input type="radio"/>	Kuwait (Vigilant Warrior)
<input type="radio"/>	Macadonia (Able Sentry)
<input type="radio"/>	Bosnia (Joint Endeavor)
<input type="radio"/>	Other _____

Which of the following best describes your current NCO or Warrant/Officer position?

Does not apply

NCO Position

- SGM/CSM
 - 1SG
 - Platoon Sergeant
 - Staff NCO
 - Squad Leader
 - Other position (specify) _____

Officer Position

- Commander
Executive Officer
Staff Officer
Platoon Leader
Other Positions

Other Position (specify)

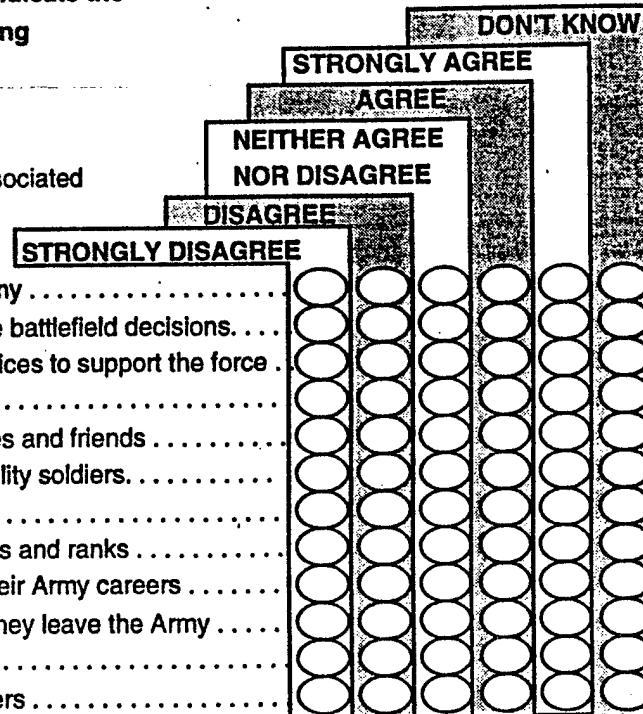
The terms "Force XXI", "Task Force XXI", "Experimental Force" and "EXFOR" are often used interchangably. In this survey, these terms refer to the Army program for putting new advanced (computer based) equipment and systems into Army units and forces.

How familiar are you with the Army's EXFOR program at Fort Hood?

Not at all A little bit A moderate amount Quite a bit Extremely

Please use the scale on the right side of the page to indicate the extent to which you agree or disagree with the following statements about the Army-wide Force XXI program.

The LONG-TERM impact of the advanced technology associated with the Army-wide Force XXI program will:



As part of the EXFOR program, have you or your unit been issued new advanced (computer-based) equipment?

YES → fill out only questions in **Section A** (next page)
 NO → fill out only questions in **Section B** (next page)

The term "UNIT" as used in this survey refers to the company, battery, or troop (line, support, or headquarters) to which you are assigned or in which you perform the majority of your work.

	STRONGLY AGREE	AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE	STRONGLY DISAGREE
The new advanced technology equipment that I/my unit has been issued:					
Is reliable					
Will enhance my performance					
Will lead to a significant positive change in the Army					
Has increased my satisfaction with my current job					
Will need to be significantly improved over the next few years.....					
Will increase the amount of information I must handle.....					
Will make my job more complicated,					
Will give me more responsibility.....					
The training I and my unit have received on this equipment has:					
Adequately prepared me to operate the new equipment					
Adequately prepared me to maintain the new equipment					
Adequately prepared my unit to perform its mission					
There is an expert available to help me if I have questions about the new equipment.....					
My participation in the EXFOR program has had a positive impact on my:					
Sense of personal accomplishment and pride					
Personal satisfaction with being a member of the active Army					
Ability to perform my current job					
Working relationships with other members of my unit					
Unit's cohesiveness.....					
Unit's readiness to plan, conduct, or support combat operations					

GO TO THE NEXT PAGE

Section B

I am satisfied with the equipment my unit has to accomplish its mission.

I am pleased that my unit is NOT getting new EXFOR equipment.

The fact that other units are getting new EXFOR equipment has:

Lowered my unit's readiness.

Lowered morale within my unit.

Negatively affected relationships among units.

GO TO THE NEXT PAGE



696



Form Number 75020-5-72

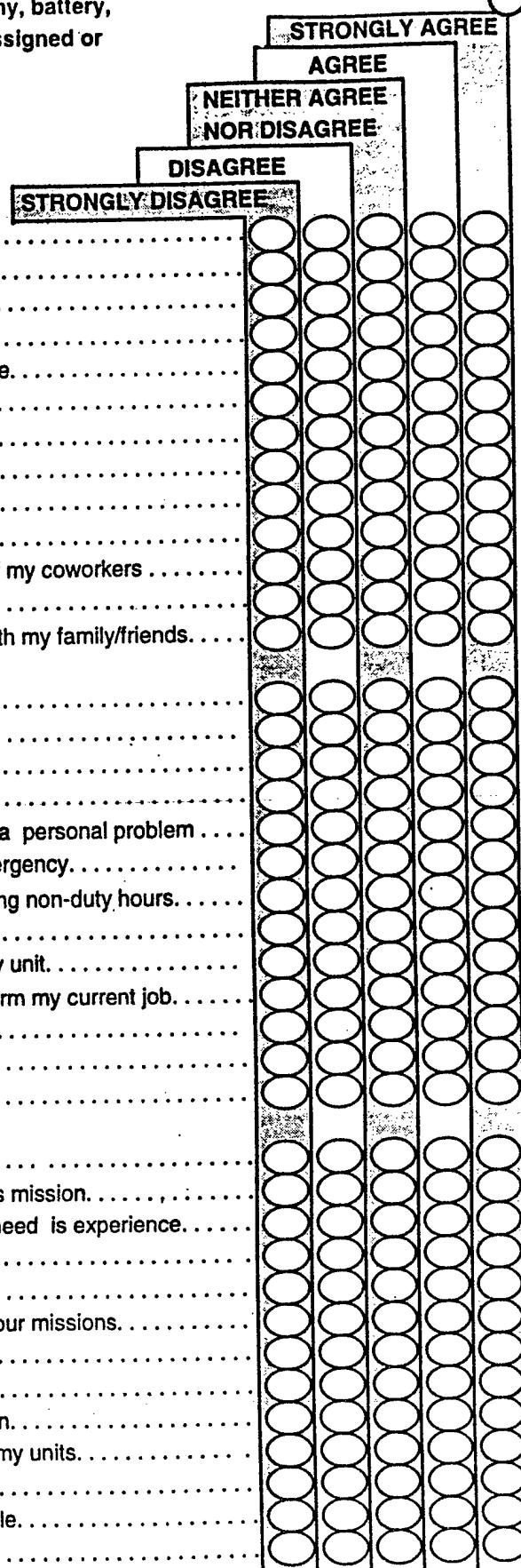
Page 3

9986

SURVEY NETWORK

The term "UNIT" as used in this survey refers to the company, battery, or troop (line, support, or headquarters) to which you are assigned or in which you perform the majority of your work.

Please use the following scale to tell us how much you AGREE or DISAGREE with the statements below.



- I understand my unit's current mission.
- The amount of work I am asked to do is fair.
- I never seem to have enough time to get everything done.
- What I do helps accomplish my unit's mission.
- Given my unit's mission, the amount of training we do makes sense.
- I know exactly what is expected of me on my job.
- I am very satisfied with my job in the Army.
- I have real confidence in my unit's ability to perform its mission.
- I am proud to tell others that I am part of the Army.
- I did not experience any problems adjusting to my current job.
- I feel confident that my skills and abilities equal or exceed those of my coworkers.
- I am satisfied with the kind of work I do on my job.
- I believe that the leaders in my unit allow enough time to spend with my family/friends.
-
- I believe in the value of our unit's mission.
- I talk up the Army to my friends as a great organization.
- Most of my tasks are clearly defined.
- My closest relationships are with soldiers in my unit.
- There are soldiers in my unit that I can go to for help when I have a personal problem.
- There are soldiers in my unit that would lend me money in an emergency.
- There are soldiers in my unit that I choose to spend time with during non-duty hours.
- There are soldiers in my unit that I would consider my friends.
- If we went to war tomorrow, I would feel good about going with my unit.
- Based on my experiences, I am confident I can successfully perform my current job.
- I know what I have to do to perform my job.
- I like my job in the Army.
- I really care about the fate of the Army.
-
- Housing on or around this post is acceptable.
- I feel that what I am doing is important for accomplishing my unit's mission.
- I have all the technical knowledge I need to perform my job, all I need is experience.
- I have so much work to do, I cannot do everything well.
- My unit is regularly briefed by our leaders about our missions.
- My leaders regularly brief our unit on what we have achieved on our missions.
- My leaders keep us informed about our missions.
- I think the level of training in my unit is high.
- I am making a real contribution to accomplishing my unit's mission.
- I think my unit would do a better job in combat than most U.S. Army units.
- My current job is well within the scope of my abilities.
- My unit's mission makes a real contribution to the Army as a whole.
- My chain of command really cares about families in my unit.

Think about your life right now and rate how much TROUBLE OR CONCERN is caused by:

	NOT APPLICABLE	VERY HIGH	HIGH	MEDIUM	LOW	VERY LOW
Marital or relationship problems.....						
Your child or children.....						
Financial problems.....						
Medical problems of your family or close friend.....						
Recent birth of a child.....						
Not knowing how long your work day will be.....						
Changes in your work environment.....						
Amount of time spent away from your family.....						
Amount of sleep you get.....						
Number of hours you work.....						
Personal health matters.....						
Possibility that you will fail on your job.....						
Promotion opportunities.....						
My or my spouse's pregnancy.....						

Please use the following scale to tell us how much you AGREE or DISAGREE with the statements below:

1=Strongly Disagree	2=Disagree	3=Neither Disagree or Agree	4=Agree	5=Strongly Agree	Does not Apply
---------------------	------------	-----------------------------	---------	------------------	----------------

The officers in my unit ...

1	2	3	4	5	Does not Apply
<input type="radio"/>					
<input type="radio"/>					
<input type="radio"/>					
<input type="radio"/>					
<input type="radio"/>					
<input type="radio"/>					
<input type="radio"/>					

The NCOs in my unit ...

1	2	3	4	5	Does not Apply
<input type="radio"/>					
<input type="radio"/>					
<input type="radio"/>					
<input type="radio"/>					
<input type="radio"/>					
<input type="radio"/>					

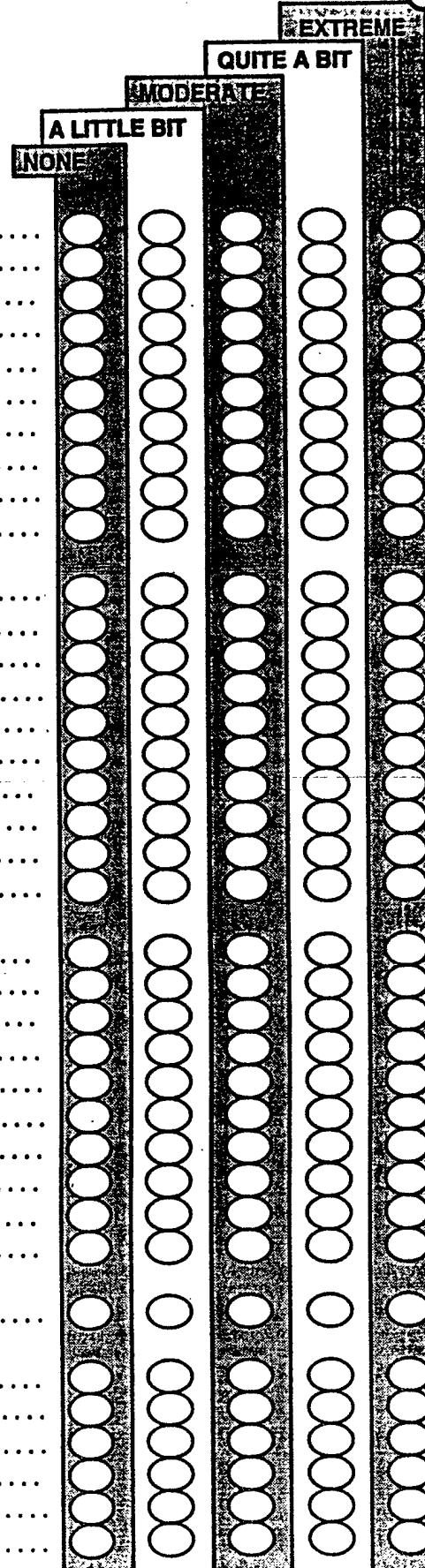
I believe that ...

1	2	3	4	5	Does not Apply
<input type="radio"/>					
<input type="radio"/>					
<input type="radio"/>					
<input type="radio"/>					
<input type="radio"/>					
<input type="radio"/>					



2705

Below is a list of problems and complaints that people sometimes have. Read each one carefully, and select the bubble that best describes how much DISCOMFORT that problem has caused you DURING THE PAST WEEK.



- Nervousness or shakiness inside
- Faintness or dizziness
- The idea that someone else can control your thoughts
- Feeling others are to blame for most of your troubles
- Trouble remembering things
- Feeling easily annoyed or irritated
- Pains in the heart or chest
- Feeling afraid in open spaces
- Thoughts of ending your life
- Feeling that most people cannot be trusted

- Poor appetite
- Suddenly scared for no reason
- Temper outbursts that you could not control
- Feeling lonely even when you are with people
- Feeling blocked in getting things done
- Feeling lonely
- Feeling no interest in things
- Feeling blue
- Feeling fearful
- Your feelings being easily hurt

- Feeling that people are unfriendly or dislike you
- Feeling inferior to others
- Nausea or upset stomach
- Feeling that you are watched or talked about by others
- Trouble falling asleep
- Having to check or double-check what you do
- Difficulty making decisions
- Feeling afraid to travel
- Trouble getting your breath
- Hot or cold spells
- Having to avoid certain things, places or activities
because they frighten you

- Your mind going blank
- Numbness or tingling in parts of your body
- The idea that you should be punished for your sins
- Feeling hopeless about the future
- Trouble concentrating
- Feeling weak in parts of your body

Below is a list of problems and complaints that people sometimes have. Read each one carefully, and select the bubble that best describes how much DISCOMFORT that problem has caused you DURING THE PAST WEEK.

EXTREME

QUIITE A BIT

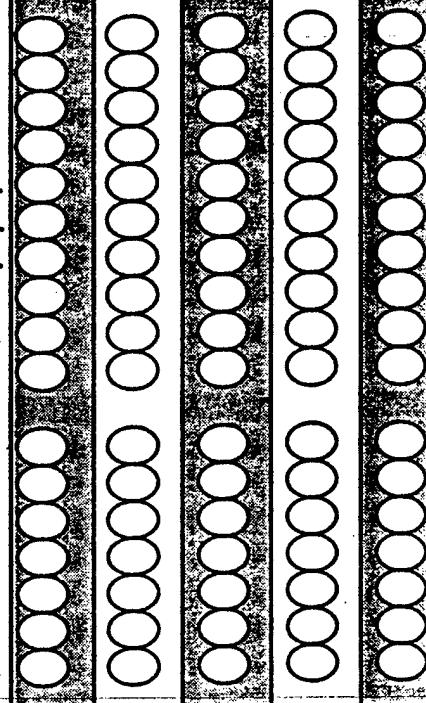
MODERATE

A LITTLE BIT

NONE

- Feeling tense or keyed up.....
 Thoughts of death or dying.....
 Having urges to beat, injure or harm someone.....
 Sleep that is restless or disturbed.....
 Having urges to break or smash things.....
 Feeling very self-conscious with others.....
 Feeling uneasy in crowds.....
 Never feeling close to another person.....
 Spells of terror or panic.....
 Getting into frequent arguments.....

 Feeling nervous when you are alone.....
 Others not giving you proper credit for your achievements.....
 Feeling so restless you couldn't sit still.....
 Feelings of worthlessness.....
 Feeling that people will take advantage of you if you let them.....
 Feelings of guilt.....
 The idea that something is wrong with your mind.....



How many weekends a month do you usually work?

None
1

2
3

4

How many days do you usually work in a week?

4
5

6
7

On average, how many HOURS A DAY have you worked in the PAST WEEK?

7 or less
8
9
10

11
12
13
14

15
16
17
18 or more

On average, how many HOURS A NIGHT have you slept in the PAST WEEK?

1 or less
2
3
4

5
6
7
8 or more

How many alcoholic drinks (1 = 1 beer, 1 glass of wine, 1 shot) do you have in a typical WORK DAY?

0
1-2

3-4
5-6

7-8
More than 8

On average, how many cigarettes do you smoke PER DAY?

None
1-5
6-10
11-15
16-20

21-25
26-30
31-34
35-40
More than 40

How many alcoholic drinks do you have on a typical WEEKEND DAY?

0
1-2

3-4
5-6

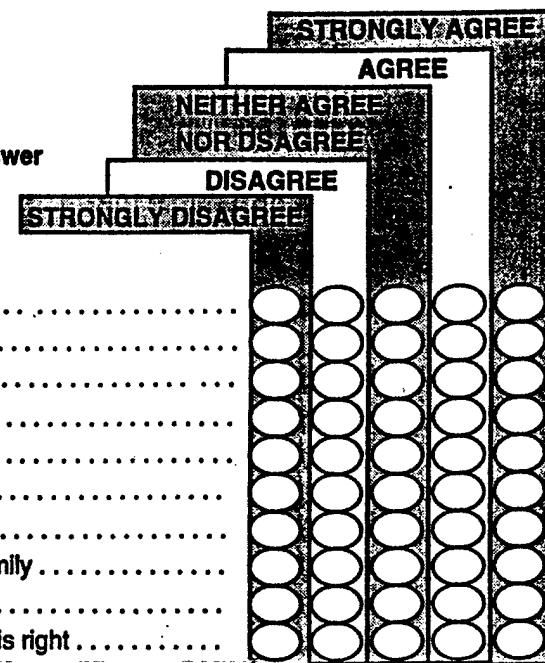
7-8
More than 8

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Which of the following describes your active duty Army Career intentions:

- PROBABLY stay in until retirement
- DEFINITELY stay in until retirement
- PROBABLY stay in beyond my present obligation, but not necessarily to retirement
- DEFINITELY stay in beyond my present obligation, but not necessarily to retirement
- DEFINITELY leave upon completion of my present obligation



Please use the scale on the right side of the paper to answer the following questions.

- I fear reporting a mistake more than making one
- My leaders sincerely want to know what is wrong
- Private prayer helps me face life
- Army values are crystal clear to me
- My leaders expect only good news
- Participation in religious services is important to me
- I am satisfied with the current level of trust in this unit
- I can count on my unit chaplain to be there for me and my family
- Soldiers in this unit are treated with respect
- When faced with tough situations, my unit members do what is right

People deal with stress in different ways. How often do you use the following when you feel stressed?
Please use the scale below:

1=Never 2=Seldom 3=Sometimes 4=Often 5=Always

Smoke cigarettes		Turn to my religious beliefs	
Become apathetic or just don't care		Decide what needs to be done	
Drink more alcohol		Daydream	
Withdraw physically from the situation		Turn to prayer, or spiritual thoughts	
Eat more		Do physical exercise	
Just try to ignore it		Complain to others	
Change what's causing the stress		Seek religious guidance	
Feel challenged		Avoid thinking about the problem	
Look for information about possible choices	○ ○ ○ ○ ○		
Feel responsible for the outcome			

Please indicate if you experienced the following physical health symptoms over the PAST MONTH? If YES, how often?

	NO	YES
		A Little Often Very Often
Head colds.....		
Sinus troubles.....		
Sore throat.....		
Constipation.....		
Headaches.....		
Back problems.....		
Allergies.....		
Skin rash.....		
Cough.....		
Chills/Fever.....		
Diarrhea.....		
Aching joints and bones.....		
Stomach intestinal upset.....		
Eye/ear/nose problems.....		
Muscle aches or cramps.....		
Hoarseness.....		
Dizziness.....		
Weight loss/gain.....		
Menstrual difficulties (women only).....		
Urinary infections.....		
Sweaty/wet/clammy hands.....		
Muscle twitching/trembling.....		
Rapid heartbeat (not exercising).....		
Shortness of breath (not exercising).....		
Other (please write in): _____		

Please use this space to write your POSITIVE and NEGATIVE comments about your current assignment.
Use the back of this page if needed. (Please ignore the DO NOT WRITE ON THIS SIDE instruction.)

Thank you for your time!